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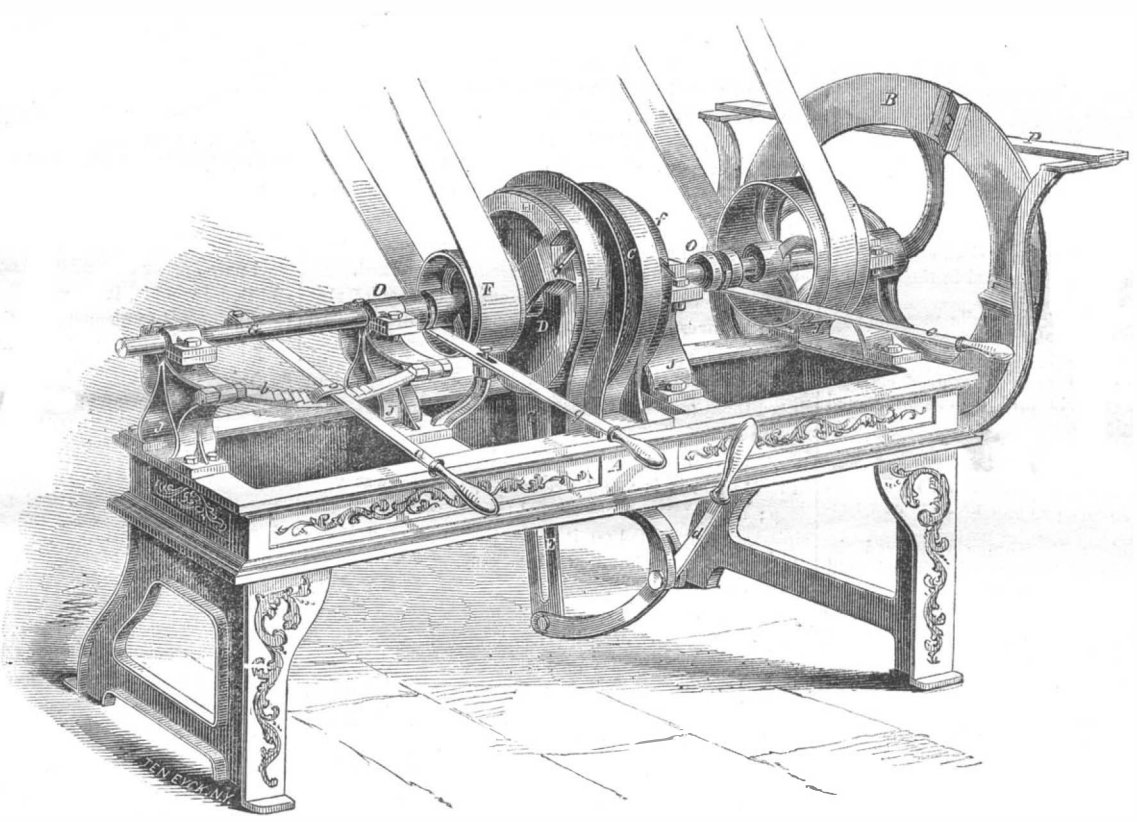
IMPROVED BARREL HEAD-CUTTER.

The great number of patents which we have taken out, within the last few years, for improvements in machinery for cutting barrel heads, illustrates in a striking manner the beauty of our patent system, and its inconceivable power in promoting the prosperity of the country. One person makes an invention of some machine—another examines it, and some improvement in it occurs to him; thus step by step it is brought more nearly to perfection by the action of numerous intellects. In barrel head-cutters, though it is difficult to conceive of a more simple and compact machine, or one which should operate more rapidly or produce more perfect work than the one illustrated in the beautiful engraving annexed, still we have seen so many things that seemed to be almost perfect very greatly improved, our experience would prevent us from being surprised if many applications should yet be made for patents for this class of machines. This invention is, however, one of the kind that we take especial pleasure in illustrating. It is made by a practical mechanic on sound common sense principles, and proves on trial to work with all the perfection that was expected of it.



MANNING'S IMPROVED BARREL HEAD-CUTTER.

The frame, A, that supports the machinery is made of cast iron, and is about six feet by two. Across the center of the frame is placed a cast iron plate, with a ring cast solid to it and rising up from the frame, as seen at I; the inner diameter of this ring is a trifle larger than the head to be made. On the frame are stands in which are bearings, as seen at J J J J, for two shafts, G G, placed in line, so as to meet exactly in the center of the ring before mentioned. The shaft at the left has a lateral motion only, and slides back and forth through its bearings, and is held from turning by a feather; on the end of this shaft is placed a disk, D, of a less diameter than the annular plate or ring before mentioned; also between the disk and bearing is placed a hub, O, to which is attached a pulley, F, and also a ring, H, holding rotary cutters. The shaft at the right has a lateral as well as a rotary motion; between the bearings is placed the pulley, F, and on the inner end is placed another disk, *f*, that holds the cutting knives for planing the head, and cutting the bevel on one side. On the other end of this shaft is placed a wheel-jointer, B, that serves the double purpose of jointing the heading and acting as a fly-wheel; this jointer is held close up to the bearing of the shaft by means of a groove in the hub, and the shaft is allowed to work through it on a feather. The plate seen at E is a thin plate of wrought iron that slides up between the cutters through a slat in the center plate, and is operated by the handle, *d*.

Having thus described the several parts, it will readily be seen that the operation is extremely simple and expeditious.

The heads may be made of any number of pieces, and are first jointed by a boy, who can lay them down without moving from his position, within reach of the one who operates the machine, who has perfect control of every part without stepping from his place. He first takes the number of pieces for a head and places them in the machine, one upon the other, edgewise between the ring, I, and disk, D, and by means of the handle, *a*, to which is attached a ratchet and pawl, *b*, clamps the pieces firmly between the disk and ring; the handle, *c*, is then taken hold of, which brings the rotary disk, with its cutters, in contact with the head, which instantly planes one side and cuts one bevel. The handle is then thrown back, and by means of the handle, *d*, the slide, E, is raised up between the planer and the planed surface; then the handle, *g*, is taken hold of, and, by a slight movement, brings the left hand cutters in contact with the other side of the head, which cuts it off, when the handle holding the pawl is relieved, and the head drops from the machine. The revolving parts run with the high velocity of 800 to 1,000 revolutions per minute, and the several operations are accordingly exceedingly rapid. The jointing of the edge certainly does not occupy more time than a wink of the eye. The cutters which cut the head out from the stuff follow each other, cutting alternately each side of the groove in the manner in which a boy cuts off a shingle with a jack-knife, thus making a very smooth cut. By connecting a simple apparatus with the shelf, P, a good stave-jointer is produced. Thus it becomes a complete machine for making both staves and heading for nail kegs, fish barrels and butter firkins, in which the staves are not planed.

Only two public exhibitions of this machine have been made—one at the last National Fair at Chicago, and the other at the last fair held at St. Louis by the Agricultural and Mechanical Institute, and at each it was awarded the first premium. One of these machines is now on exhibition at No. 53 Ann-street, this city.

The patent for this invention was issued, through the Scientific American Patent Agency, to Wilsie Manning, of Rouse's Point, N. Y., March 2, 1858, and persons desiring further information in relation to it will please address W. Manning & Co., Rochester, N. Y.

HOW SILK HATS WERE INVENTED.—The *Nouveliste* of Rouen narrates the following curious anecdote:—"M. Botta, son of one of the professors at the Academy of Caen, undertook a journey to China, and lived for some time at Canton. This was prior to 1830. He used to wear there a beaver hat in the European fashion, which suited him so well that he was unwilling to change it. However, when it was worn out, he applied to a Chinese hatter, and giving him all sorts of directions, told him to make another like it. The man went to work, and in a few days brought a hat of the required shape, not of beaver, but of some stuff very soft and glossy. M. Botta, on his return to France, preserved this curious specimen of Chinese workmanship, and wishing to have it repaired, entrusted it to a hatter, who examined it carefully, and was much struck with its mode of fabrication, which was altogether new to him. He examined the article with the greatest attention, and a short time after, the present fashion of silk hats came in. The inventor patented his discovery, and made a large fortune, but held his tongue about his debt to the Chinese tradesman, who, seeking a substitute for the beaver which he could not procure, devised the plan of replacing it by the light tissue of silk which at present almost universally constitutes the outward covering of the modern hat."

THE BEST WHITE OAK.—It has been stated by one of our cotemporaries that the British government were obtaining a large quantity of white oak timber, from the section bordering Cheat River, Va., for making gun carriages, it being the best known for that purpose. It is rather queer that, while the British government is reaching out its hands to supply its army cannon with American oak for their carriages, the use of wood is being abandoned entirely for iron in the gun carriages of the American army. John Bull sends over here for carriage material while he has a superior article at at home!

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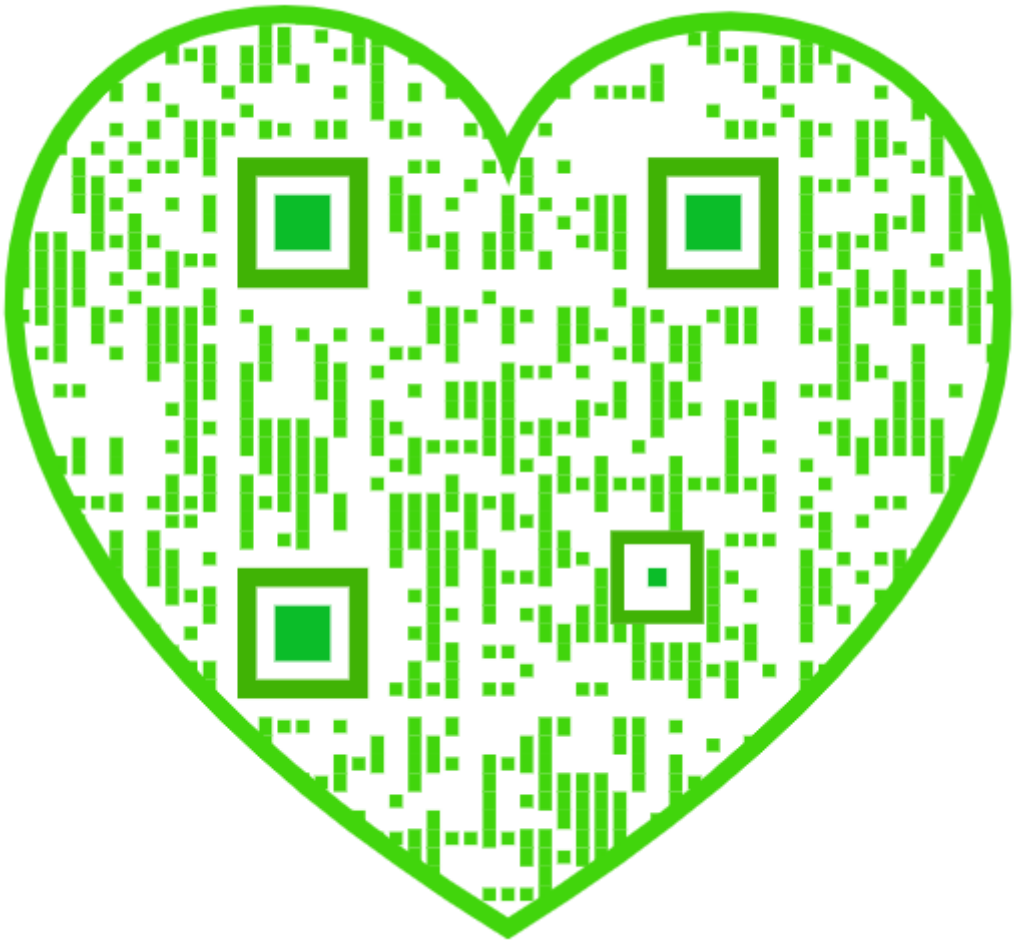

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 19th inst., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city. The chairman, Professor C. Mason, read the following report on—

ZINC.

In a remote age, the metals known to man had reached the sacred number *seven*—gold, silver, copper, mercury, tin, lead and iron equaled the seven days of creation, the seven stars, the seven colors of the rainbow, the seven sounds of music, the seven sons of Job, and the seven wise men of Greece. To have searched for more would have been presumption in a philosopher and impiety in a priest.

But nature thrust upon the notice of lead-miners an eighth substance, which had a faint metallic luster, and was fusible at a low point, but was extremely brittle and intractable, and the miners rejected it as "blind lead." Nature, however, regardless of popular opinion, pressed this same material on the attention of metallurgists, in combination with carbon and with silica, until the alchymists resolved to examine it. They put the ore into the crucible, and at the end of the roasting they found nothing left but a blackened sand; the shining particles had escaped. If it was a metal, it was volatile and invisible at its escape. They then tried to fix it by combining some other substance with it. In these experiments they tried copper. The result was a bright yellow metal, harder and heavier than copper, which they at first mistook for gold, but were finally content to call "brass." Sixty pounds of copper, treated with the *strance* ore, gave them 100 lbs. of brass. They had discovered a new metal, and set vigorously at work to separate it from impurities and alloys; finally they succeeded in confining its volatility and producing metallic zinc, which the first ship of the East India Company brought from China at about 24 cents a pound. Still it was a brittle, intractable metal, fit only to make brass. But the uses of brass increased rapidly, and the desire to cheapen that useful metal led to the invention (in Europe) of the retort process of obtaining zinc metal. This was followed, in 1806, by the discovery of vast deposits of zinc ores in Belgium and in Silesia. The product of these mines soon glutted the markets of the world, and brought down the price from 24 to 4 cents a pound. Ingenious men undertook to find out new uses for this cheap metal. Their attempts were rewarded by three inventions, which are to be noticed in the order of their occurrences.

A man of Glasgow undertook to handle metallic zinc at every temperature. At 130° of Fahrenheit he found it malleable and ductile, and up to 300° it behaved in the same laudable manner; this capacity for good conduct continued in the rolled metal until it was again heated above 300°, when it again became intractable and crusty. Immediately sheet zinc began to take the place of sheet iron, sheet tin and sheet lead; and being insoluble in water and but slightly subject to oxydation, it rose rapidly in favor with the public, and new uses are now constantly arising.

Meanwhile an ingenious Frenchman conceived the idea of converting zinc metal into an oxyd and using it, in oil, as a paint, in place of the oxyd of lead, which was known to be poisonous to the painters and to the inmates of recently-painted houses. He first obtained a coarse paint of a dull blue color; but after 30 years of experiments, Leclaire, in 1849, produced the "zinc-white," which immediately commanded such notice and commendation and public patronage as the French nation and government bestow only on great public benefactors. This invention opened a market for all the zinc products at a better price.

During this period zinc ores had come into notice at various points in our country, from Stirling Hill, in Sussex county, N. J., throughout the Saucon valley, extending south-west through Pennsylvania, Virginia and Tennessee; but especially at Stirling Hill, N. J., and near Bethlehem, Pa. The Hon. Samuel Fowler, senator in Congress, aware of the mineral treasures in Sussex county, had purchased from the heirs of Lord Stirling thousands of acres of land at and around Stirling Hill. Without knowing what was passing in France, Mr. Fowler began, more than 30 years ago, some rude but partially successful experiments to separate the zinc of Stirling Hill from the Franklinite with which it was combined, and to convert the zinc into paint. His paint resembled the first produced in Paris. He applied it to the weather-boards of a coarse building, and, 20 years after, it was found an effectual protection to the boards.

In 1834, Mr. Hassler made, from the ore of Stirling Hill, the zinc for the brass weights and measures ordered by Congress for the several States; but the cost for separating the zinc showed that the metal could not compete with the foreign article. While the owners of the mine were perplexed at this result, one of their number suggested to Mr. Gray an experiment which he made the same day. At his office, in Nassau-street, he had a heap of red oxyd of zinc. Breaking up a parcel of the ore, he threw it on the top of an anthracite coal fire in a cylinder stove. When the zinc began to flow from the ore, he held over it a clean fire-shovel. On withdrawing the shovel, he found it coated with a snowy-looking substance, which he brushed off, carried it to a paint-shop, prepared it in oil, and with a clean brush spread it on a shingle, where it dried in a short time, and left a coat of smooth, hard white paint. This humble experiment was soon wrought out by Sam. Wetherell into that ingenious machine called the "bag process," for making white oxyds of zinc directly from the ore. The "bag process" has yielded 7,000 tuns of zinc-white in the past year. Zinc-white and zinc ores are now regular articles of export; the mining at Stirling Hill and at Bethlehem can produce more zinc than is produced in any other part of the world, at prices which must find a market, and drive the poisonous white-lead out of use in all civilized countries.

DISCUSSION.

Mr. Curtiss understood that S. T. Jones, of England, first commenced making white oxyd of zinc, instead of Mr. Wetherell, as reported by the committee. It was called the "bag process" by crushing the ore to powder placed in a stove with a short pipe, and as the vapor ascended it was blown into bags by fans and resembled snow. It is the purest oxyd in this state.

Professor Mason would, at some future time, convince Mr. Curtiss that the report was correct.

Mr. Seely presented an analysis of oxyd of zinc, made by Professor Jackson, of Philadelphia, namely, oxyd of zinc 98.82, manganese 0.88, manganese per oxyd of iron 0.33. The ore of zinc was in a carbonate or sulphuret state. The carbonate is roasted, replacing oxygen for carbonic acid; and the sulphuret is converted into sulphate of the oxyd. The metal is produced by distilling in an earthen retort, at red heat, volatilizing and the carbonic oxyd escapes. The white oxyd of zinc, sometimes called "philosopher's wool," is the vapor exposed to the atmosphere according to the French process. The ores of New Jersey are the red oxyd of carbonate. Silica is more prominent than carbonate.

Mr. Chamberlain mentioned a metal like the carbonate of zinc, formed in crystal, found in the lead and iron ores of England.

Professor Mason said that zinc and other metals were mined to a greater extent in England in the time of William Pitt, by the taxes imposed, than had been since. Zinc-white is obtained here for ⅓ less than in England. Zinc fell to four cents per pound when the mines of Silesia and Belgium were commenced to be worked.

Dr. Stevens hoped that the ancient history of zinc would be investigated. The geological and minerological formations of this country were on a grander and more developed scale than in the Old World. Zinc is found in the three geological eras of the United States—the metamorphic silurian, the lower silurian, and the carboniferous. From the richness and abundance of metal in the South, it is supposed the silurian sea was very deep; for metals are not ejected from the earth, but precipitated or deposited on it to the thickness of a knife-blade or several hundred feet deep. On the lower silurian strata of magnesian limestone was found the lead and zinc at the Galena mines of Illinois, which shows, from the immense deposits, that the sea was deep, or probably an eddy whose area is unknown in the Arctic regions. In South America it is interspersed with silver. In the cretaceous rocks along the sea-board States and in the Gulf of Mexico little zinc is found.

Professor Mason was informed that, not only in Sterling, N. J., and Bethlehem, Pa., but also in Tennessee, zinc was discovered. In the latter State it had not been mined, although every facility was offered; coal being half the New York price and freightage easy.

Mr. Tillman considered that, in regard to the discussion of zinc, it had not yet been investigated satisfactorily in New Jersey.

Professor Mason would proceed by asking how metals aggregated?

Mr. Seely said that if three salts were put into hot water they would crystallize at different periods, and each precipitate in order; so in the deposits of metal.

Mr. Hendricks accounted for it by electro-metallurgy.

Dr. Stevens said the copper of Lake Superior was an instance of infiltration, and that definite calculation could not be made, owing to the chemical change excited by heat in the earth.

Professor Mason stated that the subject of zinc, in connection with Franklinite and aluminum, would be continued next week.

MISCELLANEOUS BUSINESS.

Mr. J. Montgomery presented a new iron street-pavement, pressed on each side alike into serpentine parallel ridges, 1½ inches and ¾ inch apart, which were to be filled with crushed stone, and "cambered" from curb to curb.

Mr. Worthy explained his interest table on two cylinders in a box 3×2 inches, to calculate from $1 to $10,000, and from one to five years.

Mr. Wykoff explained a plan for precipitating infinitessimal particles of gold that floated off in the water, by pouring mercury into the water at the boiling point for three-quarters of an hour, and thereby saving from $15 to $20 per tun, at the cost of $1. [This is the process described by us on page 41 of the present volume of the SCIENTIFIC AMERICAN.—EDS.

OUR SPECIAL CORRESPONDENCE.

RAILWAY MISNOMERS—NECESSITY FOR REFORM—PRACTICAL ENGINEERING—"CORN COB" CONTRACTORS.

ST. LOUIS, MO., Jan. 7, 1860.

The Ohio and Mississippi Railway, being the most direct means of communication between Cincinnati and St. Louis, carries the major part of the travel between those two cities, and also a large share of the passenger trade going westward of the latter. A word about the naming of railways. We have not been by any means happy in this respect. The plain simple method, and the most precise, is to designate the line by its two terminal (and, in some cases, its central) points. Thus, the name "Ohio and Mississippi Railway" conveys no very distinct idea of its locality and direction; there might be many lines connecting those two rivers besides the one in question, but if it was called the "Cincinnati, Vincennes and St. Louis Railway," that title would denote it at once. So of most other lines in this country. We have "Centrals," "Air-lines," "Directs," "Greats," &c., without stint; but very few, comparatively, are named as they should be. While on this topic, it may well be questioned if the term "railroad" is as appropriate as that of "railway;" I think not. People are very apt to omit the prefix, "rail," to the first word, calling it simply "road;" this results in an indistinctness of meaning, it not being of itself clear whether a common road or a railroad is meant. But when "railway" is used, the prefix is never left out. This may appear a small matter, but where it gives no additional trouble, it is as well to be correct; besides, there is more in nomenclature than many suppose. [We may here remark that, though a world-renowned author asks, "What's in a name?" and then adds, "A rose by any other name would smell as sweet," the question of the general admissibility of the principle involved in that assertion is open to serious controversy, especially on a subject of *raillery*. Our greatest American lexicographer says, in effect, that it would be a useful distinction to always apply the word 'railroad" to the ground or road on which a line of rails is laid down, and only use "railway" when it is desired to indicate the iron rails themselves.—EDS.]

The directors of the Ohio and Mississippi Railway profess to furnish sleeping cars, but on the occasion when I passed over it, not only was there no such accommodations, but there were no sleeping seats, nothing but the ordinary day seats. The track was rough—so rough that a certain freight train, which was a few hours ahead of us, refused to stay on it any longer, and be subjected to its unmerciful bumpings; so it jumped right off without much ceremony, and piled itself up, car on car, in the most approved "railway accident" fashion. The officials found it impossible to clear away the wreck in time to allow of the passage of the express train; so another train was brought from the West, and stood in readiness to receive us. We bade adieu to the Cincinnati train, walked past the wreck, and took the other cars. This change of cars (not put down on the way-bill) did not occupy much time, and was regarded by the passengers generally as rather a pleasant "break-in" on the tedium of the journey; for my part, I don't admire tramping long distances through snow-drifts at midnight. Near the crossing of the Illinois Central Railway, we encountered another rebellious freight train, that had likewise left the rails for the prairie; they managed to pull these cars sufficiently out of the way to admit of the passing of the express, so we had no second change of cars. To have *only* two run-offs in one trip is not so bad—even for the West. By-the-by, since the officials of the above line seem to have deputed the tending of the stoves to the nearest good-natured passenger, I hope that they will in future have the wood cut short enough to fit the stoves, and also have it split up finer. This suggestion is given gratuitously, and I shall not charge for

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my long services as "fireman" on the occasion referred to, although they were quite laborious.

The farther I got towards the West, the more imperfect seemed the railways; this was to be expected. The North Missouri Railway (running from St. Louis to intersect the Hannibal and St. Joseph Railway, at Hudson) is an exception, though, of course, it would bear no comparison with such lines as the Pennsylvania Central, Philadelphia and Reading, and some lines in your State; still, for such an unsettled country, it is quite passable. Single tracks, of course; gage, 5 feet 6 inches; rails, T-form, about 58 lbs. per yard; wrought iron chair of 13 lbs.; no ballast; 3,000 sills or cross-ties (of about 8 to 9 feet long) per mile, with a more liberal use of spike fastenings than one would expect; the foregoing forms about the inventory of the track. Many of the cuttings have been taken out with perpendicular sides, which are said to stand better than the ordinary slopes of 1 to 1. The clay which forms the sides of these excavations washes very readily; this is the case with the whole district of country through which this line passes. As soon as the prairie sod is removed, then look out for gullies wherever there is running water! Where the side slopes are of this nature, it may be good policy (if it is not intended to soil them) to take out the cuttings perpendicularly; but I believe that railway companies would find it to their interest to give the cuttings flatter slopes than usual, say never steeper than 1½ horizontal to 1 perpendicular, and then carefully soil them, both cuttings and embankments, with the tough prairie sod, which seems admirably adapted for this purpose. A little attention to top or surface draining, in connection with this system of soiling slopes, would cut off one of those various *leaks* (and, by no means, a small one) by which so many of our railway companies are kept in a dangerous and sinking condition, namely, the sloughing-down of the slopes and the filling-up of the bottom side drains, thus necessitating the constant employment of ditching and gravel trains, everlastingly at work cleaning out side drains, taking out slips, widening out embankments, &c. If the evil stopped here, though bad enough, it might be said, "it only costs money; it does not endanger life, as deficiencies in the rolling stock do." But it is not so; this bad condition of the side drains at once affects the track, especially on unballasted lines; and to the defective tracks are to be attributed fully one-half of the fearful accidents that annually disgrace our railway community.

Those conversant with engineering matters in the eastern part of this continent, where railways have been long established, know full well what a mammoth millstone is formed around the necks of companies by the everlasting repairs of tracks, bridges, tunnels, &c. These repairs are mainly necessary in consequence of the bad work at first put up by the contractors. I will not prolong this subject, but it is a fact, nevertheless, that most lines have to be practically re-constructed in a (comparatively) very short time after they are in running order. Yet, with all the sad experience of eastern people in this respect, here, out West, they are not only following in the same financially ruinous course, but are actually going beyond anything ever attempted in reckless construction. I would not advocate the English system of spending millions on ornamental terminal buildings, stations, ornamenting bridges, tunnels, &c.; everything of that sort would be out of place in a new country. I do say, however, that nothing that is requisite to ensure the strength of the railway proper should be omitted. Let the outside constructions be built up leisurely, according as the means of the companies and the increase of trade require them; but, in the name of humanity, let the line itself be properly constructed at first. It may be said that this method of constructing railways would retard their introduction, especially into new districts. Well, let it do so; better for the country to grow more gradually and steadily than to rush forward with the mad, feverish haste it sometimes does, then be seized with a panic, and take years to recover itself. If a man runs too fast in a race over rough ground and falls, he will drop farther behind than if he had taken more time and not tumbled down; so of nations.

Science is at a decided discount here; and, to judge by appearances, Practice (her twin sister) does not receive the cultivation they pretend to give her. How absurd to attempt to exalt one at the expense of the other! They should go hand in hand—one collecting the facts, and the other eliminating the laws which govern them. A western man, who, in his time, had been a merchant, a surveyor, an engineer, a land agent, a railway president and a professional politician (on more sides than one, by way of variety), once remarked to me, concerning a mutual acquaintance who was an engineer, "A good theoretical man, sir, but requires millions to carry out his plans; he might do well in England, with an unlimited supply of money, but he is not calculated for our western country; not practical, sir, not practical! We want men that can build railroads of *corn cobs*, if necessary!" Now, the individual in question has been practically engaged in railway construction for, at least, 14 or 15 years, but probably it will require even a longer time than that to purge him of the preparatory "education" he was unfortunate enough to receive. The same advocate of "corn cob" engineering also said of the West Point engineers, "They are too slow for us; may do well enough elsewhere, but not here." As he said this, visions of Fort Monroe and the Capital Extension rose before me, and I was silent. I had been accustomed to regard the West Point engineers as the "flower" of the profession, even though they *are* military men; for if a man can construct a fortification, he can also build a railway culvert. [We refer our correspondent to the antagonistic opinion so nobly expressed by Hon. W. T. Avery, of Tennessee, during the last session of Congress, and published by us on page 122, Vol. I. (new series), SCIENTIFIC AMERICAN, under the head of "Give to Mechanics what belongs to them."—EDS.]

Do not imagine that the "corn cob" contractor was a fool; far from it! He was emphatically a smart, active man; and I am persuaded he would make money and grow rich where Sir Isaac Newton would starve. As a specimen of the "corn cob" style of construction which he advocated, I will mention a stone arch that I lately saw, from beneath which it was feared (and with right good reason, too) to remove the centering. On speaking of it to one of the builders, he said: "Oh, those centers are of good pine; they will last a long time yet; we will leave them till they rot down; I will have them painted to preserve them as long as possible." It would probably astonish some of our New York and Pennsylvania civil engineers to be told (as I was) that 8 feet was the best width to make railway embankments (which would probably ravel down to 6 before the track was placed on them); that anything over that was money wasted, at least unless the banks were 20 or 30 feet high; and that the ends of the sills should stick out at each side—into space illimitable, I suppose. On my dissenting from these views, I was told that "long experience has shown this width to be the best out *here*." Query: are earth, air, wood and iron different "here" from elsewhere? How a horse and cart could be readily turned, and the latter "dumped," on such a bank, is a mystery to me; but the gentleman (an extensive contractor) assured me "there is no difficulty in the matter." It may throw same light on the subject, however, when it is stated that this gentleman *is paid so much per mile* for constructing the line, and *he supplies the engineering corps to look after it*. Possibly, if he was paid by the cubic yard, his ideas of the value of 8-feet banks might be modified. But I must now "switch off" for the present.

E. M. RICHARDS.

COMPRESSION OF STEAM IN CYLINDERS.

MESSRS. EDITORS:—It is not an uncommon notion among engineers that the compression of steam in the cylinder of a steam engine is a disadvantage, and that as such, it is to be obviated as much as possible. It will not be difficult to show, in a few words, the fallacy of this idea; and that, so far from being a loss, it may in certain cases be an absolute gain. Let us take, for example, a cylinder of ordinary dimensions, say 15 inches by 36, making 50 revolutions at 75 lbs. of steam, cut off at 1-6 of the stroke; the ports being 10 inches by 1 inch. The steam in this case would be expanded 6 times, multiplying its mechanical effect 2.79 times, and giving 52 horse-powers as the effective force of the engine. In the present example, supposing the steam is admitted by the ordinary D valve, with a cut-off valve on the back, there is a large amount of space contained in the port between the valve and cylinder—about 180 cubic inches; the piston also does not go close to the cylinder end. If it is half an inch off, this will give 88 additional; making a total of 268 cubic inches of useless space to be filled at each stroke, either from the exhaust steam or from the boiler. To fill this from the exhaust, it would be necessary for the escape steam to be shut off when the piston was 7½ inches from the end of the cylinder, in order that the steam may be compressed to 75 lbs. at the end of the stroke. This will deduct 8 horse-powers from the total force of the engine. The piston now makes its return stroke, the steam being admitted during its first 6 inches, and giving out its 52 horse-powers; the compressed steam in the port also expands, giving out as much power as was required to compress it, viz., 8 horse-powers; thus having the power of the engine 52 horse-powers, with an expenditure of 1,000 cubic inches of steam at each stroke.

Now what is gained, supposing there is no compression? In the first place, we gain the 8 horse-powers which were lost in the former case by compression; but we also lose 268 cubic inches of steam from the boiler to fill the port and vacancy at the end of the cylinder. This steam will give out its 8 horse-powers during expansion, making a total of 60 horse-powers, with an expenditure of 268 additional, or a total of 1,328 cubic inches of steam. In other words, without compression, we have gained 1-6th more power with an expenditure of ¼ more steam; making the advantage decidedly on the side of compressing the steam. The result will be the same whether the steam be admitted by a single valve at the center or separate valves at each end of the cylinder: only in the latter case the difference between compression and non-compression will not be so great, on account of the smaller quantity of steam contained in the port.

But this is not all the advantage. Whatever momentum there may be in the piston and rod at the end of the stroke, over and above what is given out to the engine, has to be counteracted by the returning crank; giving a shock consequently to the crank-shaft, brasses, &c. An evidence of this may be obtained by trying a locomotive engine with the wheels raised off the ground. Let the reversing handle be in full gear, and sufficient steam admitted to make the wheels revolve moderately fast, say 100 per minute; now, without altering the starting handle, move the reversing handle so as to cut off shorter, and the wheels will move round faster. What is the cause of this? Less steam is used, it is exhausted earlier, and there is greater compression; all tending to *lessen* the power. It cannot be that the slight difference in the back pressure would produce the effect; but it must be attributable to the advantage gained by the extra compression.

What, then, are the requisites to the most economical working of a steam engine? The steam should be admitted at or a little before the termination of the stroke; a rapid cut-off (so as to have no wire-drawing), variable with the amount of work to be done; compression at the end of the cylinder, so as to bring up the pressure to what it is in the boiler; and the exhaust to open a little before the end of the stroke. The exact point to begin compression may be found by having the exhaust valve variable by hand. Then, while the engine is working with its accustomed speed and load, regulate the exhaust valve until the point is found at which the engines moves fastest and easiest, and then fix it. The cut-off valves invented for the admission of steam to the cylinder are innumerable; some of them being perfect in their action, and only varying in the expense of construction or durability of the parts; but the variation of the *exhaust* valve has not yet received its proper share of attention; and, until such is the case, the steam engine cannot be said to be perfected.

E. B.

Philadelphia Jan. 26, 1860.

ANOTHER FORTUNATE INVENTOR.

MESSRS. EDITORS:—My patent came to hand this day, accompanied by your letter, &c. From the reading of the document I feel induced to bless you, as it is a much better patent than I expected. I have already contracted and sold the right of territory for over $1,000, and yet the papers are not quite ten days old! Truly I am in luck this time, and I shall always remember you with sincere thanks. I shall have another application to send you soon. As soon as the snow is gone I shall procure an ambrotype of my machine at work, and send it to you, that you may further assist me by giving a display in your invaluable SCIENTIFIC AMERICAN.

J. L.

Lockport, Ill., Jan. 18, 1860.

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BELTS FOR DRIVING MACHINERY.

Wherever machinery is used, the power necessary to drive the same is, with very few exceptions, transmitted by belts; and the question is often asked, what size belt is required to transmit a certain amount of power? To answer this question in such a manner that it can be understood by those not conversant with mathematics, is very difficult; but we will try and make the case as plain as possible.

In every belt which transmits a certain power from one pulley to another, there are three different tensions:—1. The tension, *t*, which must exist during the entire length of the belt in order to prevent it from slipping, and to enable it to transmit a certain power, P, from the driving to the driven pulley. 2. The tension, T, existing on the driving portion of the belt. 3. The tension, T′, existing on the driven portion of the belt. These tensions are in a direct ratio to the power, and in a transcendent ratio to the co-efficient of friction, on the material of which the pulleys are made, and to the arc embraced by the belt on the smaller pulley.

For common leather belts, if the arc embraced by the belt is equal to one-fifth of the whole circumference of the smallest pulley, the tension is found to be—

t=1·75 P
T=2·25 P
T′=1·25 P

for wooden pulleys; and

t=2·88 P
T=3·4 P
T′=2·4 P

for iron pulleys; and if the arc embraced by the belt is equal to ½ of the whole circumference of that pulley, the tension is found to be—

t=0·8 P
T=1·3 P
T′=0·3 P

for wooden pulleys; and

t=1·2 P
T=1·7 P
T′=0·7 P

for iron pulleys.

In all these cases the power, P, is simply expressed in pounds, and the term "horse-power" can not be introduced until the number of revolutions of the pulleys and their diameter is determined. For example, if you have a shaft making 100 revolutions per minute and you want to transmit one horse-power to another shaft, which is to make 100 revolutions per minute; the pulleys on both shafts to have a diameter of 24 inches, and the velocity of the circumference of each pulley will be 628.31 feet per minute, or 10·05 feet per second. The belt embraces one half of each pulley, and it travels with a velocity of 628·31 feet per minute. In order to transmit one horse-power, the number of pounds transmitted at the above-named velocity is to be 33,000÷628·31=52·52 lbs.; and we obtain—

t=42·016 lbs.
T=68·276 lbs.
T′=15·756 lbs.

for wooden pulleys; and

t=63·024 lbs.
T=89·284 lbs.
T′=36·764 lbs.

for iron pulleys; that is, the belt must be strong enough to sustain a continuous strain of 89·284 lbs., acting at a velocity of 10·05 feet per second (if iron pulleys are used), without altering its length or without undergoing any material change in the arrangement of its molecules. From various experiments, the co-efficient of the absolute strength of leather, such as is commonly used for belting, is found to be 3,860, which means that a piece of leather, the cross section of which is equal to one square inch, will be torn asunder if a weight of 3,860 lbs. is suspended from the same. But before the belt is really torn asunder, it is stretched to such an extent that its molecules are separated further than the elasticity of the material, from which the belts are made, will bear—the belt is on the point of breaking. The continuous strain, or the acting power required to bring the belt to this point, is found by dividing the square of the co-efficient of the absolute strength with the *modulus* of elasticity of the material from which the belt is made, and by multiplying the quotient by one-half the *volume* of that portion of the belt passing over the pulleys per second, expressed in cubic inches. The modulus of elasticity, or the power necessary to stretch a given belt to double its original length, is found by experiment; and it is, for leather, equal to 9,789 lbs. per square inch. If the acting power expressed in pounds per inch and per second be designated by E, and the volume of the belt, or the number of cubic inches passing over the pulleys per second, by V, we find from the above rule E=½ V×1,522 and V=2 E÷1,522, or the volume of the belt is equal to double the acting power divided by 1,522. It is obvious that, if the belt would be stretched to such an extent as to be on the point of breaking, it would be of no further value; and in order to give the belt sufficient strength to sustain the continuous strain to which it is subjected, the power acting on the same ought not to exceed 1-10th to 1-12th part of the power which will cause the belt to part, or the volume of the belt must be 10 or 12 times larger than indicated by the above rule. If the belt in our example is ¼ of an inch thick, its volume in cubic inches is equal to 30·15 multiplied with the width of the belt. The acting power or strain to which the belt is subjected is equal to 11,220 pounds per inch, if iron pulleys are used, and the width of the belt is found by dividing 2×11,220 by the product of 1,522×30.15, which gives about 5 inches if the belt is stretched to 1-10th part of its capacity, and 6 inches if the belt is stretched to 1-12th part of its capacity.

The case is different and more complicated if the driving pulley is larger than the driven pulley. For example, if you have a shaft making 100 revolutions per minute, and you want to transmit one horse-power to another shaft making 200 revolutions per minute, the driving pulley has to be twice as large as the driven pulley, and the arc embraced by the belt on the smallest pulley will depend upon the proportion between the two pulleys and upon the distance of the two shafts. Suppose the driving pulley to be 24 inches, the driven pulley 12 inches, and the distance between the two shafts 10 feet, and we find the angle enclosed by the prolongation of the common diameter of the two pulleys and by their common tangent to be equal to 2º 52′, and the arc embraced by the belt on the small pulley equal to ·484 of the whole circumference of the pulley, which gives—

t=0·82 P
T=1·32 P
T′=0·32 P

for wooden pulleys; and

t=1·25 P
T=1·75 P
T′=0·75 P

for iron pulleys. The velocity of the circumference of the pulleys is 628·31 feet per minute, the same as in the first examples; and the number of pounds transmitted by the belt with this velocity is 52·52 lbs., which gives—

t=43·07 lbs.
T=69·32 lbs.
T′=16·81 lbs.

for wooden pulleys; and

t=65·65 lbs.
T=91·91 lbs.
T′=39·39 lbs.

for iron pulleys. From these results it will be seen that the tension to which the belt is subjected in the second case is nearly 3 lbs. greater than it is in the first, where the same power is transmitted from one pulley to another of the same size. If the thickness of the belt in this case is equal to ¼ inch, its volume in cubic inches is equal to 30·15 multiplied by the width of the belt. The acting power or strain to which the belt is subjected is equal to 11,450 pounds per inch, if iron pulleys are used; and the width of the belt is found by dividing 2×11,450 by the product of 1,522×30·15, and multiplying the result by 10 or 12, according to the degree of tension to which the belt is to be subjected. If stretched to 1-10th part of its capacity, its width is 5·1 inches; and if stretched to 1-12th part of its capacity, its width is 6·12 inches. If the distance of the two shafts in this last example is less than 10 feet, the tension of the belt will be greater, and its width has to be still further increased in order to enable the belt to work with safety, which corresponds with the fact that long belts "draw" better than short ones.

From these examples it will be understood why it is impossible to give tables of the width of belts for different powers. The width of the belt depends upon the strain to which it is subjected, and upon the velocity and thickness of the belt. We will give the formula for the width of the belt, which is—

$$w=\frac{2\,E\,e}{A^2\,l\,t}$$

where E represents the power to be transmitted, expressed in pounds per inch per second, *e* the modulus of elasticity of the material from which the belt is made, A the co-efficient of the absolute strength, *l* the length of the belt passing over the pulleys per second in inches, and *t* the thickness of the belt in inches; and the formula shows that the width of the belt is in a direct ratio to the power to be transmitted and to the modulus of elasticity, and in an inverted ratio to the square of the absolute strength and to the velocity and thickness of the belt.

USEFULNESS OF DIAMONDS.

Many persons suppose that diamonds are only used in jewelry—for rings and other articles of personal adornment, and that they are really of no essential value whatever in the practical arts. This is a mistaken notion; they are used for a great number of purposes in the arts. Thus, for cutting the glass of our windows into proper size, no other substance can equal it, and it is exclusively used for this purpose. A natural edge or *point*, as it is called, is used for this work, and thousands of such are annually required in our glass factories. Diamond points are also employed for engraving on carnelians, amethysts and other brilliants, and for the finer cutting on cameos and seals. Being very hard, the diamond is also used in chronometers for the steps of pivots; and as it possesses high refractive with inferior dispersive power, and little longitudinal aberration, it has been successfully employed for the small deep lenses of single microscopes. The magnifying power of the diamond in proportion to that of plate glass, ground to a similar form, is as 8 to 3. For drawing minute lines on hard steel and glass, to make micrometers, there is no substitute for the diamond point.

The rough diamond is called *bort*, and the "points" used for glass-cutting are fragments of the borts. Great care and skill are necessary in selecting the cutting points, because the diamond that cuts the glass most successfully has the cutting edges of the crystal placed exactly at right angles to each other, and passing through a point or intersection made by the crossing of the edges. A polished diamond, however perfect may be its edges, when pressed upon the surface of glass, splinters it with the slightest pressure; but with the natural diamond the most accurate lines are produced on glass, and their surfaces are so finely burnished that, if ruled close together, they decompose light and afford the most beautiful prismatic appearance—all the colors of the rainbow flash from them as from the silvery interior of a pearl oyster shell.

Diamonds are also employed for drill points to perforate rubies, and bore holes in draw plates for fine wire, and also for drilling in hard steel. Some inquiries have been made of us recently in regard to using them for dressing millstones, as a substitute for steel picks. We apprehend that they are altogether too expensive to be used for this purpose at present; but if some of our inventors would make the discovery of manufacturing diamonds as cheaply as we make charcoal, which is of the same composition, we might be able to recommend them to our millers. The coke obtained from the interior of gas retorts in many cases is found so hard that it will cut glass; but as its point endures but for a short period, it cannot be made available as a substitute for the natural diamond for such purposes.

COAL TAR ON YOUNG TREES.

MESSRS. EDITORS:—Noticing an article on page 51 of the present volume of the SCIENTIFIC AMERICAN, in relation to the use of coal tar for preventing mice from girdling young trees, I send you the following statement of my own experience in the matter. Late in the Fall of 1848 or 1849, I applied coal tar with a paint brush to the trunks of 200 young apple trees, and more than half of them died during the following summer, and those which lived did not recover from the effects of the tar in less than three years. The next year I tried it on some young maples, and they also died. Both the apples and maples swelled and cracked wherever the tar touched them. The best way to prevent mice from girdling young trees is to surround the trunk with a rough box two feet high, burying the lower end in the ground about three inches. I have tried this on 500 trees and found it effectual. I am glad that you have opened this important subject, as erroneous views in regard to it have been propagated on the very highest authority; my first and costly experiment was made on the recommendation of no less a man than the late most highly esteemed A. J. Downing. J. W. M.

Amsterdam, N. Y., Jan. 21, 1860.

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GUN COTTON.

As a specimen of the articles in the "New American Cyclopædia," we publish the following extracts from the one on gun cotton:—

"Gun cotton, an explosive preparation produced by the action of dilute nitric acid and sulphuric acid upon cotton, brought to public notice in 1846, by Professor Schonbein, of Basel, Switzerland. Different methods are given of preparing gun cotton. That proposed by Thomas Taylor, of London, in 1846, is recommended as one of the most convenient, though it is best to adopt the exact strength and proportions of the acids as since given by Edward Hadow, and presented below. Mr. Taylor's process is to mix into any convenient glass vessel 1½ ounce, by measure, of nitric acid (sp. gr. 1.45 to 1.50) with an equal quantity of sulphuric acid (sp. gr. 1.80), and, when the mixture has cooled, place 100 grains of fine cotton wool in a Wedgwood mortar, pour the acid over it, and, with a glass rod, imbue the cotton as quickly as possible with the acid; as soon as the cotton is completely saturated, pour off the acid, and, with the aid of a pestle, quickly squeeze out as much of the acid as possible; throw the mass into a basin of water and thoroughly wash it, either in successive portions of water or beneath a tap, until the cotton has not the slightest acid taste; finally, squeeze it with a linen cloth and dry it in a water bath. Mr. Hadow obtained the best results by mixing 89 parts, by weight, of nitric acid (sp. gr. 1.424) with 104 parts, by weight, of sulphuric acid (sp. gr. 1.833). The sulphuric acid has no direct action upon the fiber; its effect is to take up the water from the cotton, and prevent the nitric acid from dissolving the compound, which it does in part when employed alone. Professor Ellet steeped the cotton in a mixture of niter and sulphuric acid. The cotton is not altered in appearance by being subjected to this process, but it has gained about 75 per cent in weight, and acquired several new properties. It is harsh to the feel, and crepitates when pressed in the hand. It is electrically excited by drawing the fibers through the fingers. When freshly prepared with particular care, it is soluble in ether, and forms the adhesive liquid already described under 'Collodion.' If this solution be poured upon cold water, the ether evaporates and leaves an opaque film, which, taken off and dried, is an explosive paper. At the temperature of 370° Fah. (or lower, according to Dr. Marx), gun cotton explodes; but it produces so little heat that a wisp of it may be ignited in the open hand without injury, and if upon a heap of gunpowder it is carefully brought to the explosive temperature, it may flash off without firing the powder. When confined, it exerts in exploding a much greater power than gunpowder, but so instantaneously that it is not found applicable to the purposes served by the latter material. Guns are liable to be burst by it before the exit of the ball can give room to the expansive force of the gases produced; and, in blasting, the rock is not shaken by it at a distance from the charge. Its action is too much like that of the fulminates to admit of the useful applications at first anticipated. It is, like these, moreover, exceedingly dangerous to prepare and keep in any considerable quantity, and is open to the further objection of rapidly absorbing moisture from the atmosphere to the extent of nearly its own weight, which must be expelled by drying before the material can be employed. It also decomposes spontaneously when kept for some time. The products of its combustion are carbonic acid, water and nitrogen, and, when not very carefully prepared, nitrous acid also. This and the water are opposed to its use in fire-arms. Its freedom from smoke would strongly recommend its use in mines, but its cost, compared with that of gunpowder, and the other objections named, have caused it, after several trials in different countries, to be given-up."

REMOVING SILVER FROM INJURED PLATED WARE

Among the many branches of manufacturing at Nuremberg in Germany, that of metals into various articles has attained considerable importance. They include silver-plated ware of different styles and quality, which necessarily produce large quantities of spoiled material and clippings, the recovery of which has hitherto been very imperfectly accomplished, thus causing annually a considerable loss. The reason of it was, the want of a method by which the silver might be removed without much expense, and the copper thus freed from its coating used again.

Repeated experiments have led to a very simple process by the action of concentrated nitric acid on silver and copper when present together. If these metals are placed into common commercial acid (sp. gr. 1.47) they will both be strongly acted on, but a separation of the two is unattainable, since the copper, so long as any remains undissolved, will precipitate the silver from its solution, by galvanic action. Nitric acid of the highest specific gravity (1.5), however, acts on the silver but not on the copper; it renders the copper more electro-negative than before, less oxydizable, and deprives it of the property of decomposing the acid, and precipitating the silver.

To produce this passive condition of copper, it is not absolutely necessary to employ directly acid of that specific gravity; for any concentrated nitric acid can be made to answer the purpose by the addition of a sufficient quantity of the oil of vitriol, which deprives it of a portion of its water, and thus contributes to make it stronger. A mixture of one volume of nitric acid (sp. gr. 2.47) and six of oil of vitriol does not dissolve copper at the temperature of boiling water, but with a smaller proporiton of sulphuric acid, evolution of nitrous oxyd takes place. The same end, and much cheaper, is obtained by employing a mixture of oil of vitriol and nitrate of soda, which are the materials used in practice. The following is the method now generally employed:—Oil of vitriol, together with 5 per cent of nitrate of soda, is heated in a cast-iron boiler, or better, a stoneware pan, to 212° Fah. The silver-plated clippings are placed in a sheet iron bucket or colander, which is fastened to a pulley that it may be moved about in the acid. As soon as the silver is removed, the colander is raised, allowed to drain, then immersed in cold water, and emptied to be again used in the same manner. When the acid bath is fresh, the de-silvering proceeds very rapidly, and even with heavy plated ware takes but a few minutes; with the gradual saturation of the bath more time is required, and it is readily perceived when the acid must be renewed. The small amount of acid solution adhering to the copper precipitates its silver when brought into the water. To obtain its complete removal, the clippings, when raised from the de-silvering bath, and before immersion in water, may be dipped into a second bath prepared in the same manner, which is afterwards to be used in place of the first.

The saturated bath, on cooling, congeals to a crystalline semi-fluid mass of sulphate of copper and of soda. The silver is removed by chloride of sodium, which is added in small portions at a time, while the solution is yet warm. The chloride of silver separates readily, and is washed and reduced in the usual manner. The acid solution contains but a very small portion of copper, hardly enough to pay for recovering.—*Drug. Circular.*

AMERICAN CLOCKS AND WATCHES.

American clocks have long enjoyed a world-wide reputation, and American machine-made watches have now become "fixed facts." *When* the art of clockmaking was introduced into this country, we cannot tell, but certainly we know that David Rittenhouse, F. R. S. of Philadelphia, constructed one of the most ingenious astronomical clocks in the world; that it gained him a great name in Europe and at home, before the Revolution; and that it "ticked" time for many years in Princeton College, both before and after the struggle for Independence. It is also known that John Fitch, the earliest of steamboat inventors, was a clockmaker and worked at his trade in 1761; and yet we find the following, regarding the origin of American clocks, related in a cotemporary paper, and its authorship attributed to Mr. Camp, president of the New Haven Clock Company, as having been uttered in a speech at a supper given not long ago, to the employees in his establishment. He said:—"Clockmaking was commenced about 1815, by Elias Terry, of Plymouth, who made wooden clocks, whittling out the wheels with a knife. The running was regulated by a heavy bag of sand, and was wound up by a ball at the other end of the cord. Terry used to make two clocks, swing them across his horse, and ride off in search of a market. Very soon he introduced the use of brass movements, using old kettles, because brass was scarce. When he undertook to make 200 clocks, people laughed at him; they thinking it would be impossible for him to sell them. In 1823, Hon. Chauncey Jerome commenced the business, and with progressive improvements the business now stands more perfected than any other in the country. In 1829 a wooden clock cost $11—now a much better one can be bought for $1.50. The business previously transacted by C. Jerome & Co., is now done by the New Haven Clock Co. In 1857 the company commenced making casings. Then it was thought wonderful that it turned out 75,000 clocks. In the year just ended, the company turned out 150,000 complete clocks and 170,000 finished movements."

The above statement about the origin of American clockmaking certainly requires correction. A very useful work on clock and watchmaking has just been published by J. Wiley, of this city; it is principally a translation from the French, with illustrations by M. L. Booth. From its appendix we learn that there are eight separate clock manufactories in Connecticut, which State seems to engross nearly the entire business. Although we have exported clocks to other countries for a number of years, we have (until very lately) imported all our watches from England, Switzerland and France; but there seems to be a fair prospect, now, of not only supplying ourselves, but of ultimately furnishing those articles (as we do clocks) to almost every nation. In 1850 A. L. Denison, an ingenious American watchmaker, associated himself with several others to manufacture watches in a systematic manner in a manufactory, with improved machinery for executing most of the works previously done by hand labor. This factory was first put up at Roxbury, Mass., but was finally moved to Waltham, where after a number of vicissitudes, it is now being successfully conducted. About 200 operatives are employed in it, and 12,000 watches are turned out annually. These vary from the simplest form of the lever movement to the adjusted chronometer balance. Their movements are of one uniform size, and are constructed after the English fashion. The English patent lever escapement is used, wisely modified after the Swiss method, by the omission of the main wheel fusee and chain; the power being communicated direct from the barrel to the train. The chief distinctive feature of this system is the duplication of every part of the watch by machinery. Steam power is employed, and four-fifths of the work is done by it, while in the establishments of Europe, only about one-fifth of the work is executed by machinery. These American watches have proved to be very good time-keepers, and are equal to the same class imported from abroad.

PATENT LAWS—IMPORTANT TO INVENTORS.—The Committee on Patents, in the Senate, have prepared a new patent bill, which we will endeavor to procure at the earliest opportunity for publication. At present we can only state that it provides for some very important changes, among the number of which is a clause compelling the attendance of witnesses in cases of interference before the Patent Office. Another section authorizes an Appeal Board of Examiners, and from their decision final appeals to the Commissioner himself. As we intend to review the prominent points of this bill at the proper time, we will add no more on the subject at present.

[CIRCULAR.]

TO INVENTORS AND PATENTEES.

Messrs. MUNN & Co., Editors and Proprietors of the SCIENTIFIC AMERICAN, respectfully give notice that, in addition to their own experience of nearly fifteen years, they have now associated with them Judge Mason, who for several years held the office of Commissioner of Patents. This arrangement renders their organization thorough and complete, and is a sure guaranty that all business connected with the examination of inventions, preparing specifications, drawings, caveats, assignments of patents, prosecuting rejected cases, interferences, reissues and extensions of patents, and opinions of the infringement and validity of patents will receive the most careful attention.

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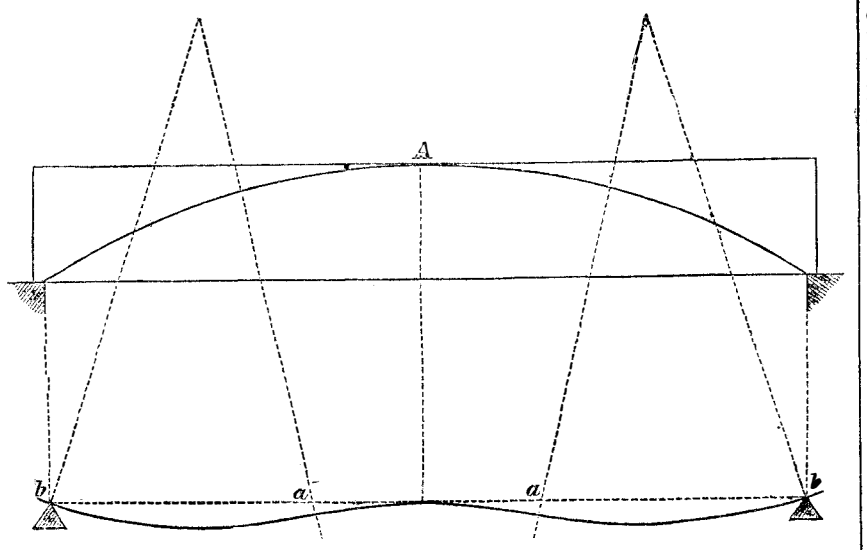
CONSTRUCTION OF ROOFS.

MESSRS. EDITORS:—The frequency of accidents from the falling of bridges, roofs, &c., must be my apology for offering the following suggestions, and for wishing to call attention to what I conceive are errors of construction. I think there are many errors; but I will, at this time, confine my attention to combined systems, especially to such as consist of parts of unequal vertical depths, such as the roof of the Union Depot, at Troy, is said to have been. This is represented to have had a span of 150 feet, the vertical depth of the trusses being 30 feet, and these are said to have been strengthened and supported along their lower parts by iron girders. The depth of these girders is not given in the report before me; but it was probably much less than that of the trusses to which they were attached. This description is brief, and it may be erroneous in some respects; but this is not of much consequence, as I only allude to this description as it has been published, because it contains the objectionable combination to which I wish to call attention, and to show that it *may* have been the cause of thefailure of this roof, and how it may be a mistake to attribute it to construction as has been done.

In order to understand why it is objectionable to unite two systems of beams, girders, or trusses of *unequal* vertical depth for the purpose of making the capacity of such combined system equal in strength to that of both when separate, it becomes necessary to consider the well-known fact (and its effect on the combination) that the deflection of each part is necessarily proportional to its length and depth. Thus, a beam, girder, or truss of given length, strength and depth will deflect about three times as much as another of similar construction of like length, and strength and *three* times the depth of the first. Now, the objection to all such combinations is that the part having the least depth, and which is most flexible, will bend away from the load more readily than the other, and leave most of it to be borne by the part having the greatest depth, so that the combination must fail, under even the most favorable circumstances, with a load that is slightly greater than that which the part of greatest depth might bear singly. When the difference in the depth of the parts is considerable, the part of least depth may, from the very first, act by its weight as a load upon the other part. But, believing that it is only necessary to call attention to the fallacy of the theory on which all such combinations are based, to induce an abandonment of all such devices, I will here leave this part, and take up another of similar nature, such as is often called for, and can be made to answer well when *rightly* arranged. I mean the suspending of the middle parts of floor girders from roof trusses, when it is desired to have the story underneath free from obstructions. When, as is most generally the case, the depth of the trusses is three or four times as great as that of the floor girders, it will be found to be best and most economical to make the floor girders in half lengths; their outer ends resting in the walls, and their inner ends suspended from the middle of the roof trusses. The walls will then sustain one-half of the floor, and its load and the other half will be sustained by means of the suspenders at the middle of the roof trusses. With such an arrangement, with the girders in half lengths, the strain on the roof truss, from the floor and its load, will be much less than when the girders are made to span the entire width of the building in single lengths, and have their middle parts supported from the roof by means of suspenders, as in the case of half lengths. This difference will, in most cases, amount to full one-fourth, as I will show hereafter. These statements may seem paradoxical to many, but a thorough examination of this question, and the results of many and various practical tests made within twenty-three years past, are such as to leave no ground for doubt as to the correctness of these conclusions. The accompanying diagram will serve to make this question more plain.

Within the parallelogram, A, is represented the outlines of an arch, and of a triangular roof truss, from either of which the middle part of a floor girder is supposed to be suspended. The compound curved line, *b b*, is meant to represent the form such girder will take when heavily and uniformly loaded; its ends bearing in walls at *b b*, and its middle suspended from the middle of the truss above.

Now, it is quite clear that all that part of the load between the points of opposite flexure at *a a*, must be sustained wholly by the suspender connecting it to the center of the roof truss. It also appears plain that in order to determine how much of the other parts is to be sustained by this suspender, and how much by the bearing at the ends, the end parts of the girder having downward flexures, between *b a* and *a b*, must be considered as separate beams, with their outer bearings at *b b*, and their inner ends as *terminating* and having their *bearings* at *a a*. It is clear that the pressure will be alike at all of these four points, and each equal to the weight of one-half of the load situated between *b a* or *a b*. By adding those parts of the load that bear on the points *a* and *a*,



to that part bearing *between* these two points, their sum will be the weight due to the suspender or center of the truss.

The same result may be obtained very nearly, when the load is uniform, by dividing it into 32 equal parts, and assigning 5½ of these parts to each of the end supports, which will be 11 for the two ends, and 21 parts to the middle support. Thus, E5½+Md21+E5½=32, where the girder is in one length; or, 8+16+8=32, when said girder is in two lengths. As the difference is 5 parts, and as this is concentrated at the middle, its effect is equal to twice this weight uniformly diffused over the truss. A right understanding of this question in all its relations becomes important indeed. Many of the recent failures of floors, roofs, and bridges may without doubt be charged to a want of such knowledge and a right application of it. BENJAMIN SEVERSON

Baltimore, Md., Jan. 6, 1860.

THE OLD FRANKLIN PRESS.—The old press at which Franklin worked in Boston, on the New England *Courant*, in 1720, has been preserved more than a century in the office of the Newport *Mercury*, which was established by James Franklin, brother of the philosopher, who then owned and used the press. It has recently been sold, and is now the property of J. B. Murray, Esq., banker, Mr. Murray was, previous to the recent purchase, owner of a press at which Franklin worked, in Watt's printing-house, near Lincoln's Inn Fields, London, in 1725-6. The old press Mr. Murray procured in London, in 1841, and deposited it for safe keeping in the United States Patent Office, at Washington, in 1842, where it still remains. The only presses identified with the name o. Benjamin Franklin are now under one ownership, and will probably be kept together during his lifetime.

THE GREAT WASHINGTON AQUEDUCT BRIDGE.

MESSRS. EDITORS:—Among the public works now in course of completion at Washington, one of the most remarkable, though least known, is the Washington Aqueduct Bridge over Rock Creek, at the western end of Pennsylvania avenue, now nearly completed from my own designs and under my direction. As a great national work of art, indicative of the astonishing progress of the American people in civil-engineering, I trust you will deem it to be a subject of sufficient importance and general interest to deserve a place in the columns of the SCIENTIFIC AMERICAN.

The bridge is a cast iron arch of 20 feet rise and 200 feet clear span between the abutments. The arch consists of two ribs, each of which is composed of 17 cast iron pipes of 48 inches internal diameter, and 12 feet 8 inches in length. They have flanged ends pierced with holes for screw bolts, by which the pipes are firmly connected together. After being cast, they were placed in a lathe, and the ends and flanges were accurately turned or faced off. They are put together in the form of a circular arc, the faced ends abutting against each other, and 40 screw bolts firmly secure each joint. Such is the accuracy obtained by the present use of machinery in engineering, that these joints are water-tight, under the aqueduct pressure of 120 feet head, by mere application of the dressed surfaces of cast iron, no packing or cement being used in the joints.

Upon these two arched ribs, which are firmly connected with each other by cast iron tubular crossbraces and heavy wrought diagonal ties, is erected a framework of heavy rolled iron "H" beams (from the works of the Phœnix Iron Company of Philadelphia), supporting two continuous horizontal iron girders, of 204 feet 6 inches in length. Upon these girders rest crossbeams of timber, supporting the roadway of the bridge, which embraces two city railroad and carriage tracks and two paths for foot passengers.

The cornice of the bridge is decorated with *modillions* of cast iron, and a light wrought iron railing surmounts the whole.

The abutments, founded upon solid rock, are built in the most substantial and durable manner, of a fine gray sandstone, obtained in large blocks from the government quarries at Seneca, upon the Chesapeake and Ohio Canal, 24 miles from the city of Washington. The strength of this stone is 17,000 pounds per square inch.

This bridge is particularly remarkable for the double duty which the arch performs. While it supports a roadway, forming a beautiful and much-needed communication, by which the traffic between the cities of Washington and Georgetown is carried over, the water of the Washington Aqueduct is conveyed into the city of Washington through the pipes of which the arch is composed. To guard against all danger of freezing, the pipes are lined with staves and resinous pine timber, three inches in thickness, leaving a clear water-way in each rib of three and a half feet in diameter.

The flanges and bolts by which the pipes are connected at the joints are covered with decorative moldings, encircled with foliage of cast iron. The arch ribs spring from ornamental bases, which distribute the pressure over huge blocks of granite set in the skew back of the abutments. The intersections of the beams in the framework of the spandrils are covered with ornamental bosses, also of cast iron. The whole is a model of lightness and elegance, being 200 feet in clear span and 45 feet in hight from the water to the top of the parapet.

The abutments contain vaults, in which are the connecting pipes and stop-cocks for regulating the flow and discharge of water; and in the western abutments on the Georgetown side, one of the vaults serves as an engine-room and contains a water-pressure engine—the first, it is believed, erected in this country.

This engine, drawing its supply from the cast iron street mains of the Washington Aqueduct, pumps 10,000 gallons of water per hour into a reservoir on the hights of Georgetown, a mile distant, and 204 feet above the machine. This reservoir supplies that portion of Georgetown which is above the level of the great store and distributing reservoirs of the Washington Aqueduct. In a recent experiment, the engine, using 10,862·2 gallons of water per hour, under an effective pressure of 99·86 feet as power, pumped 10,410.4 gallons of water against an effective head or resistance of 90.245 feet. This gave an useful effect of ·866 of the power employed; the loss

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being absorbed in friction, in producing motion of the parts of the engine and of the water and in leakage, the latter alone being about 2½ per cent of the water used. By the formula given by Weisbach for the efficiency of the engine alone, the efficiency of the engine and pump being considered equal, 12½ of the total loss of effect being due to the motor, the efficiency of the motor here used is 933, a very high result. The engine and pumps were built by H. B. Worthington, of New York city, under his patent of 1855.

The masonry of this bridge has been executed by Messrs. Carman & Dobbins, of Philadelphia, contractors; the iron work by Messrs. A. & W. Denmead & Sons, of Baltimore. The style of the work is creditable to those engaged upon it.

The Washington Aqueduct has other works not less remarkable than the one described; among them, the great granite arch, by which the masonry aqueduct, nine feet in diameter, crosses the Cabin John Creek, at a hight of 101 feet above the bed of the stream. The arch is built of huge granite, is 20 feet wide, 57 feet 3 inches rise, and, being 250 feet in clear span, is the largest stone arch in the world. Had either of these bridges been constructed in Great Britain, the public press would have teemed with illustrations and descriptions of them, and every reading man, woman and child in Europe and America would have been as familiar with their history as with that of the Menai Bridge or the *Great Eastern*; while in Washington they are quietly executed, and few but those who have bestowed upon them the thought and toil necessary to their design and construction, seem to know of the existence of such national achievements of science and skill. M. C. MEIGS.

Washington, Jan. 27, 1860.

A WONDERFUL NATURAL PHENOMENON.

MESSRS. EDITORS :—Science recognizes no unexplained phenomenon as being too trivial for investigation. The science of galvanism was deduced from investigating the cause of the twitching in a dismembered limb of a frog; Newton would know why an apple fell from a tree, and he stumbled upon the discovery of gravitation. Among the hills and valleys of the East and upon the plains of the West, I have observed a phenomenon which must be due to a force pervading our globe. The object of this communication is to solicit inquiry into that force. Whenever the ground freezes hard, careful observation will discover minute fissures in the exposed earth, running N. N. W. and S. S. E., nearly. These fissures are more or less in width, and parallel with each other, yet not continuous; being broken into lines of various lengths. It looks as if the ground had been lightly swept with a brush or raked with a comb, and had afterwards frozen, obscuring yet not obliterating their traces. It is best observed in plowed lands, and by the roadside, in lands of friable nature. These lines ever preserve an invariable course—in the shade at the bottom of gulleys or ravines or climbing embankments, they turn neither to the right nor to the left; thus excluding the supposition that either the sun or the wind is the cause of the phenomenon. It is evidently due to some cause which prevails over the crystallization of water, and perhaps it is determined by the molecular constitution of solids. It is stated that suspension bridges become unsafe by a re-arrangement of their atomic particles; may not this phenomenon be due to the same cause? I suggest the agency of *electricity* as the moving cause of the phenomenon above described. It is known that a change of temperature will give rise to electrical disturbance. May not the change attendant upon congelation develop electricity sufficient to account for the phenomenon of those earth-fissures, and the aurora borealis? If an electric coil be placed above and around a magnet in the direction of its length, there will be a deflection of the magnet to the right or left, dependent upon the direction of the current. If these lines be due to electric currents, they probably indicate the direction of those currents, and the deflection of the magnet to the North is a consequence of its developed antipathies.

An elimination of this subject, then, is not without practical and scientific interest. May not those electrical currents ever be inducing changes in the atomic constitution of all objects? Animals killed by electricity quickly putrify. May not the rapid decomposition of frozen vegetables be due to the agency of electrical change and re-arrangements of atoms, developed during congelation? May not the rapid decomposition of organic matters during warm weather be decomposition by electricity developed by a change of temperature? Observations and explanations of the phenomenon above alluded to, together with ahswers to other queries herein propounded, are requested through the columns of the SCIENTIFIC AMERICAN. MEDICUS.

Hopkinsville, Ky., Jan. 21, 1860.

[Probably most of our readers have observed the cracks in frozen mud caused by the freezing, and if it is really true—which we strongly doubt—that these cracks extend invariably in the same direction, N. N. W. and S. S. E., it is certainly a very curious fact. Will our readers please observe this phenomenon in different parts of the country and let us know the truth in regard to it?—EDS.

TRICKS OF THE WINE TRADE.

The United States are represented to be the largest consumers of champagne, and the consumption per annum is estimated at a million baskets. The whole champagne district, says the *Pennsylvanian*, is about 20,000 acres, and the amount of wine manufactured for exportation is 10,000,000 bottles, or about 800,000 baskets. Of this, Russia consumes 160,000, Great Britain and her possessions 165,000, France 162,000, Germany 146,000, and the United States 220,000. The Custom House in New York, through which passes a large amount of the champagne imported into this country, reports 175,028 baskets per annum. Therefore, 780,000 baskets of the wine drank in this country for imported champagne is counterfeit—an amount equal to the whole supply of the champagne district for the world. We have no doubt of the fact that a large amount of spurious, villainous stuff, called "champagne," is annually consumed by our people; but it should not be forgotten that a good deal of genuine, sparkling Catawba is made and sold here.

POSITION IN SLEEPING.—It is better to go to sleep on the right side, for then the stomach is very much in the position of a bottle turned upside down, and the contents are aided in passing out by gravitation. If one goes to sleep on the left side, the operation of emptying the stomach of its contents is more like drawing water from a well. After going to sleep let the body take its own position. If you sleep on your back, especially soon after a heavy meal, the weight of the digestive organs, and that of the food, resting on the great vein of the body, near the back bone, compresses it, and arrests the flow of blood more or less. If the arrest is partial, the sleep is disturbed, and there are unpleasant dreams. If the meal has been recent or hearty, the arrest is more decided, and the various sensations, such as falling over a precipice, or the pursuit of a wild beast, or other impending danger, and the desperate effort to get rid of it, arouses us; that sends on the stagnating blood, and we awake in a fright, or trembling, or perspiration, or feelings of exhaustion, according to the degree of stagnation, and the length or strength of the effort made to escape the danger. Eating a large, or what is called "a hearty meal," before going to bed, should always be avoided; it is the frequent cause of nightmare, and sometimes the cause of sudden death.

TAKING COLD.—A "cold" is not necessarily the result of low or high temperature. A person may go directly from a hot bath into a cold one, or into snow even, and not take cold. On the contrary, he may take cold by pouring a couple of tablespoonfuls of water upon some part of his dress, or by standing in a door, or before a stove, or sitting near a window or other opening, where one part of the body is colder than another. Let it be kept in mind that uniformity of temperature over the whole body is the first thing to be looked after. It is the unequal heat upon the different parts of the body that produces colds, by disturbing the uniform circulation of the blood, which in turn induces congestion of some part. If you must keep a partially wet garment on, it would be as well perhaps to wet the whole of it uniformly. The feet are a great source of colds on account of the variable temperature they are subjected to. Keep these always dry and warm, and avoid draughts of air, hot or cold, wet spots on the garments, and other direct causes of unequal temperature, and keep the system braced up by plenty of sleep, and the eschewing of debilitating foods and drinks, and you will be proof against a cold and its results.

A COLUMN OF VARIETIES.

Peter Bayne, who succeeded Hugh Miller in the editorial chair of that able paper, the *Edinburgh Witness*, has been selected as the editor of the new London daily, the *Dial*. The founders of this new sheet aim to place it in the front rank of the metropolitan journals. Mr. Bayne is widely and favorably known in this country, through his essays and his work entitled "The Christian Life."……The engines of the *Great Eastern* steamship work with an expenditure of about four pounds of coal per horse-power per hour……The Lancaster and Carlisle Railroad, in England, has been leased for 900 years……The English government is pushing the increase of its navy with such vigor, in order to keep ahead of the French, that, at the Portsmouth dock-yard alone, steamships are being launched at about the rate of one a month……The number of patents issued in the year 1848, was: in Great Britain, 1,890; in the United States, 3,710; and in France, 5,820. Thus, the United States issued about twice as many as Great Britain, and France more than both Great Britain and the United States combined. The numbers issued in the following countries, were: Belgium, 1,406; Austria, 703; Sardinia, 171; Saxony, 107; Sweden, 64; Prussia, 49……Common pitch is a good cement for the seams of an aquarium. It will not color the water, and contains no elemeut injurious to fishes……The common opinion is that we should take good care of children at all seasons of the year; but it is well enough in the winter to *let them slide*……It is reported that some very fine specimens of cotton grown in Queensland have been sent to Sydney, and it seems probable that cotton will become a staple production of this new colony after its separation from New South Wales……Herr Hochstatter, of Hesse Darmstadt, has invented a species of paper, the explosive power of which, and other projective capabilities, are said to surpass those of gunpowder. He has been invited to Woolwich to try the efficiency of his new discovery……The British government is drawing largely on the white oak forests of Virginia. Above 300 men are now employed in getting timber in the mountains near Rowlesburg, on the Cheat river, which is to be used for gun-carriages. The contractor has orders which it will take two years to complete. The Cheat river oak is said to be the best yet imported into England, and far surpassing the Canada oak, which it is fast superseding……An English journal says that, after years of mechanical labor and many mechanical tests, James White, of Wickham Market, has completed, and has now in constant operation, a self-winding clock, which determines the time with unfailing accuracy, continuing a constant motion by itself, never requiring to be wound up, and which will perpetuate its movements so long as its component parts exist……The power delivered by an engine is considered to be its theoretical power less the friction of its own parts. Morin ascertained that after the friction of an engine, working at its proper speed without load, had been determined, 7⅓ per cent of the remaining power was expended in overcoming the additional friction of the engine caused by the load brought upon it. A steam engine working without load has been moved with an effective pressure of three-fourths of a pound per square inch of the pistons. ……In 1854, an officer at Sevastopol was knocked down, not by a cannon-ball itself, but by the wind of it, as the ball passed close to him. The commotion produced was so intense that the tongue of the officer contracted instantly, and he could not articulate a word. Subsequently he was relieved by electricity……The human frame can withstand, without injury, a few minutes' exposure in an atmosphere heated to 325°. The principal effect, beyond increased perspiration, is a very considerable quickening of the pulse. The same temperature would cook a beefsteak in a very few minutes……Of the total power developed on the pistons of marine screw engines, it is estimated that but from 60 to 70 per cent are expended in the propulsion of the vessel. The proportion with paddle engines is, perhaps, no greater; sometimes only 43 per cent is utilized……Trevithick's locomotive, in 1804, was the result of a wager of 1,000 guineas, made by Samuel Homfray, of the Pen-y-darren Works, that he would convey a load of iron for a distance of nine miles along a cast iron tram-road……The *Great Eastern* has the largest screw propeller ever made, the diameter being 24 feet.

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IMPROVED PLANER.

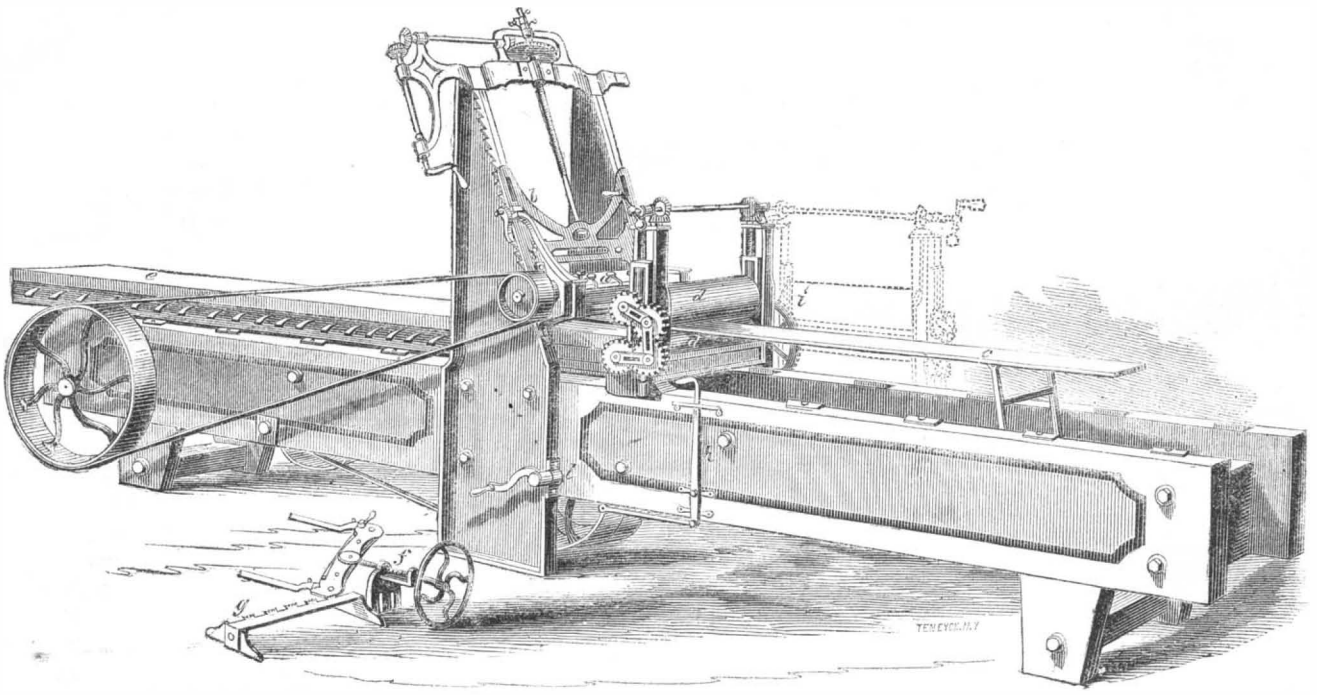
This is a combination of two costly machines, the Daniels' planer and the Woodworth machine, in one; which can be built at an expense but a trifle more than either of the two.

Our illustration represents it arranged as a Woodworth planer; the revolving cutters, *a*, being hung in the sliding frame, *b*, so that they may be raised or lowered according to the thickness to which the stuff is to be planed. The plank, *c*, is fed between the rollers, *d d*, which carry it along by their revolutions under the cutters. When it is desired to plane stuff out of wind, as is done with the Daniels' planer, the frame in which the rollers, *d d*, are hung is swung round on a hinge out of the way, by the farther side of the machine, as shown by the dotted lines, and the bed, *e*, is brought into use. This bed being moved along to the right hand end of the machine, the dogs, *f* and *g* (seen loose in the cut), are fastened upon it, *f* at its right hand end and *g* at such place as will bring it at the opposite end of the stuff. The winding plank or other wood to be planed is dogged on the bed, and this being thrown into gear, is carried under the revolving cutters which reduce the surface of the plank to a plane from which it will not twist on being released from its hold. When the machine is thus arranged, stuff may be planed by it from ½ to 16 inches in thickness, and by removing the left hand dog, *g*, and introducing the small pressure roller, *k*, in front of the cutters, stuff may be planed as thin as 1-16th of an inch. The bed is carried along by a rack upon its under side which gears into a driving pinion, and the direction of this pinion's motion may be changed by means of the handle, *h*, so as to carry the bed both ways by the power of the engine. The gear which drives the pinion by which the bed is carried back and forth is on the shaft, *l*, and a series of gears on the further end of the same shaft, *l*, turns the rollers when they are in use and the machine is arranged as a Woodworth planer; a lever on the further side of the machine, not shown in the cut, serving to shift the feed gear either to the bed or to the rollers, as may be required. One distinct subject of invention in this machine is the shape of the cutter-head, which is made concave from the edge of the cutters on the inner side, so as to operate like the double iron of the bench-plane to break the shaving and make smooth work in cross-grained hard wood. The crossbar of the dog, *f*, is pivoted in the middle, and the two arms are pivoted at its ends, thus adapting the dog to hold timber or plank the end of which is not at right angles with the length, or to hold two pieces of unequal length.

The object of these several combinations is the production of a machine practically adapted to the various kinds of shop work, such as carpenters' shop work, pattern-making, pianoforte work, cabinet work, sash and door-manufacturing, ship-carpentering, &c. It can be adapted to sticking, architraves, cornices, base moldings, and various other kinds of work.

It is protected by three patents: one issued Aug. 22, 1854; the second, Sept. 4, 1855; and the third, Jan. 24, 1860. The claims of the last patent may be found on another page. It received a silver medal at the last fair of the American Institute. This machine, with the recent improvements, can be seen in practical operation at Ross & Marshall's cabinet manufactory, corner of Eleventh-avenue and ty-ninth-street, and at John F. Cunningham's sash and door manufactory, corner of First-avenue and Twenty-seventh-street, this city.

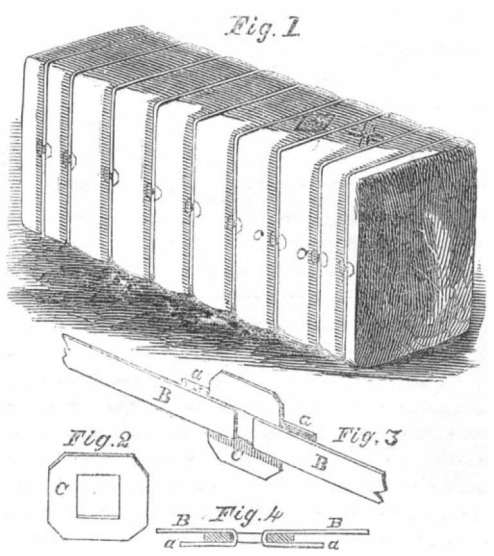
For any further information in relation to this invention, inquiries may be addressed to Gray & Woods' machinery depot, No. 69 Sudbury-street, Boston, Mass.



GRAY AND WOODS' IMPROVED PLANER.

NEW IRON HOOPS FOR COTTON BALES.

The manifest superiority of iron over cotton or hemp as a material for the bands of cotton bales has, within a few years, been recognized, and many of our most ingenious inventors have endeavored to devise some plan for fastening the ends of the iron bands, in a manner free from all objections, and the consequence is that a great many patents have been issued upon them. The inventor of the plan which we here illustrate states that



he has succeeded so perfectly in accomplishing this object that the shipmasters at New Orleans refuse to receive iron-bound cotton bales unless they are secured by his tie; its peculiar flatness allowing the bales to slide over each other, and thus greatly facilitate the handling and stowage.

The plan is so simple that it will be understood at a glance. The ends, *a a*, of the flat iron band, B B, are bent at right angles and hooked through the flat metal plate, C, in the manner plainly shown in the cut. The bands of iron are superior to those made of vegetable fiber in two important respects—they do not stretch, and thus the bale is preserved of the size to which it is compressed; and they do not burn, thus rendering a bale almost incombustible, for a bale of cotton can hardly be burned until the hoops give way and allow it to open to the air. The iron band is also adapted to bales of cloth as well as of cotton, having at least the advantage of cheapness, as they cost less than those of cotton or hemp.

The patent for this invention was secured through the Scientific American Patent Agency, Nov. 15, 1859, and persons wishing to obtain further information in relation to it, will please address the inventor, John T. Butler, at Natchez, Miss.

OLD CHINESE SUSPENSION BRIDGES.—Sixteen hundred years ago, the Chinese exhibited great engineering skill; and had they continued to devote themselves to improvements in the arts and sciences, they would have been the most civilized nation at present in the world. In the second century of the Christian era, according to the concurrent testimony of all their historical and geographical writers, Shang-leang, the commander-in-chief of the army, undertook and completed the formation of roads through the mountainous province of Shense, to the west of the capital. Hitherto its lofty hills and deep valleys had rendered communication difficult and circuitous. With a body of 100,000 laborers he cut passages over the mountains, throwing the removed soil into the valleys, and where this was not sufficient to raise the road to the required hight, he constructed bridges, which rested on pillars or abutments. In other places he conceived and accomplished the daring project of suspending a bridge by ropes from one mountain to another across a deep chasm. The bridges, which are called by the Chinese writers "flying bridges," and represented to be numerous at the present day, are sometimes so high, that they cannot be traversed without alarm. One still existing stretches 400 feet from mountain to mountain over a chasm of 500 feet deep. Most of these flying bridges are so wide that four horsemen can ride on them abreast; balustrades being placed on each side to protect travelers.

RESIGNATION OF COMMISSIONER BISHOP.—We regret to learn that the Hon. William D. Bishop, who has rendered himself so popular during the short time that he has held the office of Commissioner of Patents, has, as we are informed, in consequence of the pressing nature of his private affairs, felt himself compelled to resign his office. The ex-Commissioner is not the man to remain long in private life, and we presume he will soon be heard from in some field of political activity.

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VOL. II., No. 6.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, FEBRUARY 4, 1860.

RAILROAD SAFETY AND BRAKES.

ALL railroad companies are servants of the public; and, as corporations, they have no private rights. For certain privileges granted unto them by the people, they have become bound by public contract for the safety of travelers placed within their charge. Every person, when he enters a railroad car as a legal passenger, places his life in the keeping of the company that owns the railroad, and he is perfectly dependent on the power, skill and care of those who are carrying him along on his journey. No higher trust can be imposed upon any company than the safety of human life and property. Every individual employed upon a railroad, from the highest officer to the lowest, should be deeply impressed with the responsibility of his charge, and all of them should work in harmony. To the highest officials belong the duty of making the necessary regulations and providing the means for securing safety; and on the under-officers the duty is imposed of carrying out the orders of their superiors. A culpable failure in either of these links of safety is a public danger and a public crime.

The recent accident on the Hudson River Railroad (noticed in our last number) was one of a very peculiar character, and deserves more than ordinary attention. On this railroad there is a double track, and, in this respect, it is safe from collisions by opposing trains. The accident that occurred was caused by one train running into another on the same track. With good regulations, faithfully executed, no such sad event should have taken place. Now, as safety in traveling is a public question of general interest, the cause of this catastrophe should be scrutinized with just severity. From the evidence elicited before the coroner's jury in regard to Mrs. Field, who lost her life on that occasion, it is perfectly clear that the express train which was run into had a disabled locomotive, and it was long behind time from this cause when it left Sing Sing, at 3.40 P. M.; yet, with a perfect knowledge of this fact, the officers of the after-train started at 3.51 P. M.—only eleven minutes behind it. After running a few miles, the first train was brought to a halt in a very dangerous position (about 700 feet after passing a curve), and where it could not be seen from behind until the turn of the track was reached. It had only been stopped five minutes when the second train came thundering around the curve at a speed of twenty-five miles per hour, and on it went, crushing through the standing one, spreading destruction in its path. The interval of time and space between the two trains was far too short; and as there was no danger to the after-train from any other crowding behind, it was an act of gross recklessness either on the part of the conductor or engineer, to have been running at such a rate of speed around that curve. This point has been clearly made out. But were those who had charge of the first train free from blame? It is related in evidence, that when the train stopped, with a full knowledge of its dangerous position, it was three minutes afterwards before the subordinate brakesman was started back with the red signal flag of danger; also that, although he could have reached the curve in that period of time, he was so slow of motion, and so reckless of danger and duty, that he had only proceeded 200 feet when the down train came dashing round; and, although the brakes were then put on, and the locomotive reversed by the engineer, the fatal deed was done; these efforts and agencies failed to stop it in a space of 700 feet, and it struck the standing train when moving at a speed of fifteen miles per hour. Here is another point clear. Those connected with the first train were not prompt in doing their duty, so as to run back with the danger-signal whenever their train stopped. Had this been done on the one hand, and the other train been proceeding more slowly on the other, the collision would not have taken place. These conclusions are inevitable from the testimony given in the case. The engineer on the first train may have been able to have gone farther, so as not to stop in such a dangerous position; and we consider there was also mis-management in attempting to run through with such a locomotive, as the train had to stop *three* times previously on account of its defective steam pipe. These evils or wrongs we have traced to the management of the trains. But there were other means of safety also necessary, and the inquiry naturally arises, was the running train provided with the most important of these, viz., *efficient railroad brakes?* From the testimony elicited, it appears that it was *not*. It was fitted with the "Creamer patent brakes," but, although the engineer applied them when 700 feet distant, the speed of the train was only reduced two-fifths when it struck. Is there no brake capable of arresting such a train within a less space than this? There is no subject of greater moment to railroad travelers and companies than an efficient means of destroying the momentum of railroad trains with ease and rapidity. During the past year, twenty-eight experiments were made in England by Wm. Fairbairn, F. R. S., to test two different brakes, and he has reported that a train of 60 tuns can be arrested when running at the rate of 20 miles per hour in a space of 72 feet; at 30 miles, in 159 feet; 40 miles, in 282 feet; 50 miles, in 441 feet; and at 60 miles, in a space of 636 feet—which is less than was the distance between the two trains on the Hudson River Railroad when first seen. Creamer's brake is wound-up with a coiled spring, held in place by a clutch, to which is attached a cord; and by drawing this, the engineer throws the line of brakes into instant action. The English brakes referred to were operated in this manner exactly; and yet they proved eight times more efficient. With one of these powerful brakes on the Hudson River Railroad train, it would have been stopped in a space of 100 feet. We certainly require just as efficient brakes on our railroads as they do in England on theirs, and there is no excuse left for not having them. We have inventors and mechanics who can devise and construct railroad brakes of equal, if not superior, efficiency; and to delay longer in securing such upon every railroad train in our country will be a criminal neglect of duty on the part of those who control their management.

PATENT EXTENSION CASES.

The following parties have applied to the Commissioner of Patents for the extension of their patents for a term of seven years:—

Reaping Machine.—Patent granted to Clinton Foster, of St. Francisville, Mo., April 18, 1846. The case is to be heard at the Patent Office on the 2d of April next; the testimony closes on the 19th of March.

Sawmill.—Patent granted to Thomas J. Wells, of New York City, April 11, 1846. The case is to be heard at the Patent Office, March 26; testimony closes on the 12th of March.

Curry Comb.—Patent granted to William Wheeler, of New Britain, Conn., April 25, 1846. The case is to be heard at the Patent Office, April 9; testimony closes March 26.

Persons who wish to oppose the extension of these patents should attend to it without delay. Copies of the claims can be procured of us upon the receipt of $1 each for copying.

THE NEW COMMISSIONER OF PATENTS.—Ex-Governor Thomas, of Maryland, has been appointed Comsioner of Patents, to fill the vacancy occasioned by the resignation of the Hon. William D. Bishop. It will be about a month before Gov. Thomas will enter upon the important duties of his high office, which, we trust, he will fill to the satisfaction of inventors and the country.

THE NEW CANADIAN PATENT LAW.

Most of our readers are already aware that the present patent laws of Canada are, in some respects, the most illiberal of any that are to be found upon the face of the earth. No person who is a non-resident of that province can legally obtain a patent therein for any invention, however important or useful. It matters not that the applicant is a fellow-subject, unless he has also his home in Canada. The Arkwrights and the Watts, of Great Britain, would have been treated with no more consideration than though they had been subjects of the Emperor of Russia.

This policy of exclusion, though impartial, operates with peculiar severity upon our own inventors. Most of our valuable patents are in substance infringed upon through that medium with entire impunity. Not only are the inventions themselves remorsely appropriated in that country without compensation to the rightful owner, but the very machines which have been thus taken without leave send back their products under our free rule of reciprocity, in ruinous competition with manufactures made here on machines which have paid a license fee to the inventor; thus operating as a discriminating tariff to that extent against our own mechanics.

We had hoped to see this illiberal policy long since disappear before the light of reason and the march of civilization. In most respects we and our Canadian neighbors are but one people. In language, religion, laws, customs and lineage, we differ from them but little, if any, more than the inhabitants of one State differ from those of any other. The late reciprocity treaty removed the almost sole remaining barrier to our full and perfect brotherhood. Still, the barrier which, of all others, should have been the first to have given way, remains inflexible as yet. All the efforts which, for several years past, have been directed to its removal have been wholly ineffectual, if not nugatory.

It is true that our own law must bear much of the blame of this condition of our relations with our northern neighbors. We allow Canadians, it is true, to obtain patents in the United States; but we charge them a patent fee which is in most cases prohibitory, being more than sixteen times greater than that required from one of our own citizens. This ought never to be, and will not long continue. This provision of our law meets with few or no apologists at home, and has only continued to exist from the fact that, from causes not necessary to be mentioned, all legislation on the subject of patent laws has been postponed from year to year until further delay is becoming impracticable. For the last six years, each annual report of the Commissioner of Patents has urged the removal of all discrimination between native and foreign inventors, and bills have been repeatedly introduced in accordance with such recommendations. Whenever any considerable modifications of the patent laws shall take place, this will be very sure to be among them; and such modifications can hardly be postponed beyond the present session of Congress.

A reciprocal feeling has from time to time been manifested among our Canadian neighbors, which has thus far, been equally fruitless. Recently a new and more systematic effort has been made. A commission has been appointed to prepare a complete code on this subject, to be presented to Parliament at its session in February. This step is in the right direction and evinces an earnestness which is an augury of success. This relic of a more barbarous age, when hostile legislation was deemed a test of patriotism, will not long resist this assault upon both sides at once, aided by the general intelligence of the age, which has enabled us to understand that justice and generosity to our neighbors are in a thousand ways reflected back in blessings on ourselves. We congratulate the inventive genius of the world upon this auspicious change, and hope the Congress of the United States will vie with the Canadian Parliament in acting more efficiently and speedily to remove disabilities and discouragements from that class which is still continuing to confer the greatest blessing on our common humanity.

We have received a copy of the bill which has been prepared as above stated, and find in it much to approve and little to which we can object. It is drawn upon the general basis of our own patent law, and embodies nearly all of its most valuable provisions. But it copies some of its defects; and with a view, not to officiously interfere in the affairs of our neighbors, but in a spirit of friendli-

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ness, and to give them some of the results of our experience, we shall briefly review some of the provisions of that bill.

It establishes a Patent Bureau with a Commissioner at its head, and provides for a Patent Board to be composed of the President of the Council, the Commissioner of Patents, and the Attorneys-general and Solicitors-general of Upper and Lower Canada—six members in all. This board is to grant all patents, and is to exercise an appellate jurisdiction over all the decisions of the Commissioner.

We think this Patent Board will be found cumbersome and inconvenient. We have once had a similar system, which proved unsatisfactory. By the law of 1836, the Secretary of State, the Attorney-general and the Commissioner of Patents constituted a board for certain purposes, but the arrangement has long since proved unsatisfactory. A single executive or administrative officer is preferable to a board, and the business of an office will be more promptly and satisfactorily performed when its incumbent is confined strictly and solely to the duties of that particular office.

A "Register of Patents" and a "Register of Proprietors" are provided for, which are but different names for corresponding features in our system. Certified copies from either of these registers are to be receivable as *prima facie* evidence of the patent or of the license or assignment. So far as it respects the "Register of Proprietors" (or as we term it, the record of assignments), the rule is different with us. The record of an assignment proves nothing, by our law, but the mere fact that there is such a record. It is not even *prima facie* evidence of the *genuineness* of the assignment. Unless such assignments are required to be acknowledged before some public officer, it may be doubtful whether it will be safe to make such a copy proof of the validity of a transfer. It is true that penalties are provided against false entries and forgeries, but this is rather a slow and uncertain remedy for such evils.

Patents are granted to any person irrespective of his condition or country, and without any discrimination as to the amount of the fee required. This is a great advance over the illiberality and want of wisdom of our own law, and one which, for the credit of our country, we hope the Canadians will not be beforehand with us in making.

The only distinction made between natives and foreigners is that aliens and non-residents are required to commence the manufacture of the thing patented within one year after the date of the patent, and to supply the patented article in sufficient quantities to meet the demand therefor; whereas, the resident citizen has five years within which to do the same. A failure, in either case, to comply with this requirement renders the patent invalid.

We have always been opposed to any such distinction in our own law, but shall not attempt to dictate to our Canadian friends. We should have been better pleased with the law if this feature were omitted; but even while this remains, it will be so much less objectionable than the present law of either that country or of this, that we cannot find it in our hearts to complain. We will, however, suggest that such a regulation will prevent the taking out of many patents in Canada which would otherwise be patented there. A very large proportion of those who make inventions have not the means of manufacturing what they have invented, and the law would thus, to some extent, tend to discourage the very class it is designed to protect.

The proposed law enables parties in patent cases to obtain the testimony of witnesses in the same way as in ordinary civil suits, thus supplying a defect in our own law which is wholly inexcusable,

It provides for a provisional protection of six months, which is better than our caveat system, and intended for a like purpose. It also allows of a temporary protection of three years, at a reduced patent fee, thus enabling the patentee to fully test the value of his patent before incurring the expense of a full patent. This is also a good regulation, and will prevent the accumulation of a vast number of useless patents, which with us serve no purpose but to stand in the way of some subsequent invention.

In relation to re-issues, additional improvements, disclaimers, and assignments, the bill is substantially the same as our law.

The date of the patent is to be stamped or engraved on each patented article vended or offered for sale, under a pretty severe penalty. This is like our law but needs some modification, as sometimes the patented article is so small as not to admit of being so marked.

Provision is made for repealing patents when fraudulently or surreptitiously obtained, or when issued improvidently. This is a very important regulation, not found in our law.

The 53d section contains some provisions which might be advantageously modified. A patent is rendered invalid if the subject-matter is found described in any printed publication prior to its discovery by the patentee. This is our law, but it is too broadly expressed, both here and there. It has sometimes happened that a valuable patent to a *bona fide* inventor has been rendered invalid in consequence of finding a description thereof in some obscure and forgotten work published a quarter of a century previous. In such cases the new inventor has conferred the same benefit upon the world as though he were the *first* inventor of that which, but for him, would have been still unknown to the world. It is like the restoration of a lost art, except that, in this case, the real utility of the invention was perhaps never before known.

Again, the public use of the invention prior to the application for a patent renders such patent invalid. This was our former law, but we now allow it to be used for a term of time not exceeding two years, without prejudice to the inventor. This was a salutary change.

Finally, it is made a misdemeanor, punishable by fine and imprisonment, if it be proved, on the trial, that the patentee was not the original discoverer, but that the invention had been previously in use. Comment is unnecessary to show the undue severity of such a regulation which has doubtless found its way into the bill through inadvertence.

Provision is made in the bill for the registration of designs, the general nature of which is greatly superior to our law, and will supply a want which has long been felt in this country.

The bill is very copious, containing one hundred sections. Our space only permits us to glance at it now. We feel highly gratified to witness its appearance; and with some changes which a more careful consideration will doubtless suggest, it may be rendered a model law, worthy of the imitation of every nation in Christendom.

FIRE-BRICKS.

The bricks which are employed to line the interior of stoves, the sides of furnaces and steam boilers, are made from a peculiar earthy substance known as fire-clay. It is found in deposits in various parts of the world, and very often in the coal regions where it appears in regular beds. The name is derived from its refractory character, as it withstands a very high degree of heat with impunity. Its constituents are silica, 70.6; alumina, 25.9; oxyd of iron, 2; carbonate of lime, 1.5. Sometimes there are also traces of magnesia in it, and the proportions of the foregoing are also modified according to locality. In some deposits there is a little more silica and a little less alumina than in others, but these two substances are the leading ones of this clay, and silica the principal one.

In making fire-bricks, the clay, after being dug out, is exposed to the atmosphere for same days, and sometimes weeks, before it is removed to the mill, where it is ground into a coarse powder with a mixture of about one-sixth of old burnt clay. The common mill used for grinding it is simply two large stones or cast iron wheels set on an edge and revolved by a shaft in suitable bearings in a trough into which the clay is fed. This is the old Chilian mill which has not yet found a superior for some purposes. The trough or bed plate in which the clay is ground is of cast iron, and as the clay is reduced to a proper fineness it falls into a receptacle, from which it is carried away by a conveyor similar to that in a grist mill, and is then deposited in a common pug mill where it is mixed with water and thoroughly kneaded into a proper condition to render it fit for molding. These bricks are molded like building bricks, and are afterwards exposed to heat in a warm apartment, where they are thoroughly dried preparatory to being burned. For this purpose they are placed in kilns similar in form and construction to those employed for baking pottery-ware. Here they are subjected to a very high heat, and it generally takes constant firing for five days before 15,000 bricks can be burned in a kiln 14 feet in diameter and 10 feet high. The firing of such bricks must be conducted with great care. They are so laid on their edges, one above another and in rows, that spaces of about half an inch are left between the lines. These spaces answer the purpose of minute flues; the flame and hot gases from the fire pass through them up to the chimney which is situated at the back end of the kiln. The firing is commenced slowly, and the temperature gradually increased towards the end of the operation.

It is the infusible character of fire-clay which renders it so valuable and serviceable to the arts. Without it, we could not carry on our iron manufactures, as no other substance is equal to it in every respect for lining the walls of the smelting furnaces, and without iron a thousand useful arts could not be practiced. Iron, lime and magnesia—in short any metallic alkaline substance in fire-clay, is an impurity and injures its refractory character. For many years all the fire-bricks used in America were imported from England, and many still come from that country, but in Baltimore, Md., the manufacture of them is now conducted on a very extensive scale from clay found in the vicinity of that city.

WELDING AT A SINGLE BLOW.

In our notice of Wendt & Seymour's scissors, on page 290, Vol I. (new series), of the SCIENTIFIC AMERICAN, we mentioned the fact that they were welded by a drop which completed the operation at a single blow. From the London *Engineer*, of Dec. 30, 1859, we learn that at one large establishment in England, railroad wheels are welded by a similar process. The several parts of the wheel, having been previously forged, are placed in a mold, in proper position, and heated to a welding heat. They are then placed under a powerful steam hammer, furnished with dies for giving the requisite form to the wheel, when one crushing blow not only welds the several parts together, but almost finishes the wheel. The *Engineer* says that the economy is enormous.

Is not this one of the most important improvements which have been made for a long time in the working of iron? Why cannot knives, chisels, and nearly all articles of cutlery be welded and "finished" (in the technical sense) by this wonderfully short process? As the article does not have time to cool, when thus welded, could it not be plunged at the proper temperature into the cold bath, and thus the hardening, as well as the welding and finishing, be done at one heat?

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

FIRE-ARMS.

This invention consists in the construction of a fire-arm with several chambers arranged in a circle concentric to a common barrel with whose bore they are severally connected by means of converging passages, or by being themselves made to converge towards it. It further consists in the employment, in combination with the said chambers, of a plate containing holes whose arrangement corresponds with that of the said chambers, for the the purpose of withdrawing the empty cases of metallic cartridges from the said chambers after their discharge. W. H. Morris and C. L. Brown, of this city, are the inventors.

VALVE GEAR OF STEAM ENGINES.

This invention consists principally in the combination with two movable toes on the valve rockshaft of a steam engine, of two eccentrics arranged at right angles to each other, or thereabouts, on the crankshaft or other rotating shaft of the engine, and connected by a movable yoke with the rockshaft, for the purpose of enabling the steam to be cut off from the cylinder by the main valves at any point of the stroke that may be at any time desirable. The inventor of this improvement is Julius King, of Hoboken, N. J.

AUTOMATIC LAMP-LIGHTING DEVICE.

This invention consists in applying to a lamp a match-holder and friction-plate, the latter having a spring connected to it, and so arranged that, when liberated and actuated by the spring, the friction plate will ignite the match, and thereby cause the lamp to be lighted. The invention is more especially designed to be applied to alarm clocks to be operated by the same simultaneously

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with the sounding of the alarm. It may, however, be used separately and operated by a cord in cases where it may be necessary. The credit of this contrivance is due to George K. Proctor, of Beverly, Mass.

COILED SPRINGS.

This invention consists in crimping or corrugating the steel wire previous to forming it into a coiled or helical spring; and in conjunction with this crimping it consists in giving to the wire at each bend a half twist which will give resilent action to the wire when formed into a coil. This improvement was designed by James W. Peck, Jr., of Brooklyn, N. Y.

MACHINE FOR PICKING MILLSTONES.

This invention relates to an improvement in those machines for picking millstones which have the pick shaft fitted in a sliding frame attached at one end only to the bed-piece or stock of the machine. The object of the invention is to obtain a more delicate and perfect adjustment of the pick so that the stones may be "cracked" or picked between the large or master furrows in a more perfect manner than hitherto. The invention also consists in giving the framing of the pick shaft an independent adjustable movement, whereby the desired result is attained. The patentee of this invention is E. W. Daniels, of Springfield, Mass.

WAGON BRAKE.

This invention relates to an improvement in that class of wagon brakes in which the brakes are connected with the draft pole, and are generally termed "self-acting." The object of the invention is to obviate the difficulty hitherto caused by the binding of the draft pole in its guides and the consequent imperfect action of the device. The invention consists in having the back part of the draft pole attached to a shaft which has a pinion at each end, the pinions gearing into racks attached to the vehicle; the whole being so arranged as to insure a positive movement of the draft pole or to insure the parallelism of the front axle of the vehicle and the shaft which is attached to the draft pole, and thereby obviate the difficulty alluded to. This device has been patented to Jacob Dutcher, of Gibson, Pa.

FOREIGN NEWS AND MARKETS.

The cold has been very severe in many parts of Europe, and especially so in France, when several persons were frozen to death in localities where frost is seldom seen. In the city of Lyons, a sentinel was frozen to death in his sentry-box. The Parisians have been rendered almost demented by the cold, which was about 10 degrees below the freezing point. The suburbs of Paris, outside of the gates, contained, last year, a population of about 300,000; now these are taken within the imperial domain, the circumference of which has been increased by a radius of one mile. By this change in the dimensions of the city, it will be 30 miles in circumference, and have a population of 1,500,000.

There has been a vast increase in the number of British steamships during the past few years, and they are fast superseding sailing vessels of all classes. In 1850 there were 1,181 steam vessels in Great Britain; the net tunnage of which was 167,398. In 1851, there were 1,916 steam vessels, with a net tunnage of 451,047, and a gross tunnage of 682,433. There has been a decided increase in the size of new steamers built, of late; and by great improvements in economizing fuel, they have become much more profitable than formerly. The saving of coal in British steamships, during the past three years, amounts to at least 30 per cent on an average. At the present moment there are some very large contracts in the course of fulfillment at Newcastle, among the number of which are two for large iron steamers for the Atlantic trade, the speed of which is to be from 16 to 20 miles per hour. At Glasgow quite a number of new iron steamers—amounting in value to about $5,000,000—are also on the stocks.

Old as Mother England is, she appears to have considerable vitality in her system. No country in the world raises such a revenue, and as this is an indication of her productive powers, she certainly stands pretty high in this respect and carries very capacious pockets. The following is the amount of British government revenue for the years 1859 and 1858, the total for each year (£66,070,469 sterling) being the equivalent of about $333,000,000, a sum five-fold greater than the taxation, direct and indirect, required for the support of the federal government in this country, per annum, and at least three-fold greater than the sum total required for the annual support of our federal and 33 State governments combined.

As Scotch pig iron is about as well-known in America as in the country where it is made, owing to its soft, smooth character which renders it well adapted for various kinds of castings, a short sketch of its progress will not be out of place. It is just about 100 years since the first iron furnace was erected in Scotland. To-day there are 125 furnaces in blast. and the product of 1859 amounted to 950,000 tuns. The increase has been very great of late years, and what is remarkable, all this is a source of income. This iron is mostly exported. The exports during April. May and Jnne of last year amounted to 60,000 tuns per month. The price per tun in December last was £2 18s. 9d. (about $14), and the demand good at this price. Thirty years ago, £6 and sometimes £11 were obtained for a tun of Scotch pig iron. So many and so great have been the improvements made that good profits are now obtained for present low prices—less than one-fourth the old rates; and what is more wonderful still, there has been an increase of wages to the iron operatives. The coal, ironstone and limestone in Scotland are found in the same mines, one lying above the other—a combination of natural resources and advantages not existing, in the same perfection for smelting iron, anywhere else.

NEW YORK MARKETS

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 56c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, per chaldron, $12; cannel, $13.

COPPER.—Refined ingots, 24c. a 24½c. per lb.; sheathing, 22c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8½c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 9c. a 9¼c.; good ordinary, 9⅞c. a 10⅜c.; middling, 11⅜c. a 11⅞c.; good middling, 12c. a 12¾c.; middling fair, 12¾c. a 13⅛c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8½c.; sheetings, brown, 36 a 37-inch, per yard, 5½c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7¾c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¼c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 80c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $30; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $22; Fustic, Savanilla, $19 a $20; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a 23; Logwood, Tabasco, $31; Logwood, St. Domingo, $13 a $13.50; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $12.50 a $13; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $4.95 a $5.10; Ohio, common brands, $5.20 a $5.30; Ohio, good and choice extra brands, $5.80 a $6.75; Michigan, Indiana, Wisconsin, &c., $5.20 a $5.30; Genesee, extra brands, $5.60 a $7.25; Missouri, $5.30 a $7.50; Canada, $5.50 a $6.75; Virginia, $6.25 a $7.25; Rye flour, fine, $3.75 a $3.90; corn meal, $3.30 a $4.20.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $95 a $97. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5½c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 47½c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60c. a $1.15; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $25 a $26; Bar, Swedes, ordinary sizes, $35 $36; Bar, English, common, $42.50 a $43; Refined, $53 a $54; Sheet, Russia, 1st quality, per lb., 11½c. a 11⅝c.; Sheet, English, single, double and treble, 8½c. a 8¾c.; Anthracite pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.30.

LATHS.—Eastern, per M., $2.

LEAD.—Galena, $5.80 per 100 lbs.; German and English refined, $5.65 a $5.70; bar, sheet and pipe, 6¼c. a 7c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 20c. a 21½c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 to $30.; Patent enameled, 16c. a 17c. per foot, light Sheep, morocco finish, $7.50 a $8.50 per dozen.; Calf-skins, oak, 55c. a 60c. per lb.; Hemlock, 56c. a 60c.; Belting, oak, 33c. a 34c.; Hemlock, 28c. a 31c

LIME.—Rockland, 75c. per bbl.

LUMBER.—Timber, white pine, per M. feet, $17.75; yellow pine, $35 a $36; oak, $18 a $23; eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; White Pine, Albany boards, dressed, tongued andgrooved, $20 a $21; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c.a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $58; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3¾c. per lb.; American clinch, 5c. a 5½c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.35 a $3.50; Olive, in casks, per gallon, $1.12 a $1.25; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 48c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.45; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 92½c. a 97½c.; red oil, city distilled, 60c.; Wadsworth's refined rosin, 30c. a 40c.; Wadsworth's boiled oil for painting, 35c a 40c.; Wadsworth's tanner's improved and extra, 30c. a 40c.; camphene, 44c. a 46c.; fluid, 50c. a 53c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9½c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermillion, Chinese, $1.12½ a $1.22; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Turpentine, soft, N. C., per 280 lbs., $3.50 a $3.56; Wilmington, &c., $3.50 a $3.56; common, per 310 lbs., $1.60 a $1.65; strained and No. 2, $1.62 a $1.95; No. 1, per 280 lbs. $2 a $2.75; white, $3 a $4; pale, $4.50 a $5.50.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Olive, 7c. a 7¾c.

SPELTER plates, 5⅝c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4½c. a 5½c.

SUGAR.—New Orleans, 7c. a 8¾c. per lb.; Porto Rico, 7c. a 8¾c.; Havana, brown and yellow, 6¾c. a 9¼c.; Havana, white, 9⅜c. a 9⅝c.; Brazil, white, 8c. a 8¼c.; Brazil, brown, 7¼c. a 7¾c.

SUMAC.—Sicily, $70 a $90 per tun.

TALLOW.—American prime, 10⅜c. a 10¾c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.50 a $9.37½, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.: extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7¼c. per lb.

The foregoing rates indicate the state of the New York markets up to January 26th.

The *Shipping and Commercial List*, says:—"To hear the lamentations which are periodically uttered by persons of a dismal turn of mind over the unhealthy condition of American trade, and to recall the disastrous reminiscenses of the sweeping revulsion which overtook us, in common with the rest of the world, three years ago, one might be beguiled into the belief that this country had done growing, and was now standing still. An intelligent study of statistics will dispel that illusion, and show that, in all the elements of substantial wealth and power, our progress is onward."

The Crescent Iron Works, at Wheeling, Va., have contracted to manufacture 4,500 tuns of tubular T-rails for the Memphis branch of the Louisville and Nashville Railroad.

Cleveland, Ohio, is becoming one of the largest wool markets in this country. Of 6,762,563 lbs. shipped from that city, the last year, much more than half seems to have passed East from Albany, over the Western Railroad, towards Boston; nearly 1,200,000 lbs., stopping, however, between Pittsfield and West Brookfield, as follows:—Springfield, 342,004; Pittsfield, 292,209; Palmer, 267,852; Warren, 65,332; Ware, 35,081; Monson, 11,395; West Brookfield, 147,399. The shipment to Boston was 786,021, which was larger by some thousands than the amount sent to New York; thus indicating that Massachusetts is the chief seat of our woolen manufacturers.

Recently the weather has been very mild over the entire country, but the severe cold weather at the end of the old year made sufficient ice to to afford a very large crop, which has been carefully housed. The Philadelphia *Ledger* states that 80,000 tuns have been stored in that city.

It is not in cotton alone that frauds are committed; hay seems to be as favorable a product for unprincipled persons to operate upon, as the white fibrous product of the South. A petition has been introduced into the New York legislature asking for an inspector and proper regulations in the sale of hay in this city. It is stated in the petition that in three-hundred-pound bales of hay, 40 and 50 pounds of green wood, and sometimes a big stone, are found inside.

Our shipping merchants have petitioned for a space of ground in the Battery Park to erect an observatory, intended for nautical uses entirely. We hope they will succeed; the movement made last year among some of our prominent citzens, to get a great and grand observatory in the Central Park, has produced no fruit whatever; we trust that our shipping merchants will persevere in their efforts until success crowns them.

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Patent Claims

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING JANUARY 24, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

26,878.—J. T. Allen, of New York City, for an Improved Bed Bottom:

I claim an adjustable elastic bedstead bottom, the crossbar, a, angular shaped block, e, screws, d, or their equivalents, brackets, h′, elastic band, c, and slats, g, arranged substantially in the manner and for the purpose described.

26,879.—C. Bixler, of Rogersville, Ohio, for an Improved Lard-expresser:

I claim the strainer, A, and pressure plate, B, connected by hinges or joints, and provided with handles, C D, arranged as shown and described, to form a new and useful article of manufacture, for the purpose specified.

[The object of this invention is to obtain a simple implement for expressing lard from pork scraps, technically called cracklings; one that may be manipulated with facility, perform the work effectually, and greatly expedite the process.]

26,880.—D. C. Brown, of New York City, for an Improved Churn:

I claim the disks, F and G, in their combined action, having upon their inner sides the rings, a a a, &c., all in the manner substantially and for the purpose specified.

26,881.—John H. Belter, of New York City, for an Improved Bureau:

I claim, first, The described specific construction and union of the sides and bottom of the drawers, whereby are obtained the advantages set forth.

Second, The described manner of locking and unlocking all the drawers by the lock of a single drawer and the spring, C, or its equivalent.

Third, The springing catches, m, combined and arranged relatively to the rigidly locked bar, D d, or its equivalent, substantially in the manner set forth, so as to allow a drawer or drawers to remain free at pleasure after the single lock, F, has been locked, and subsequently to lock them, in the manner and with the advantages shown.

Fourth, The described combination and arrangement of the locking devices, d m, and of the handle, I, with the described construction of the drawers, for the purpose set forth.

26,882.—Thomas W. Brown, of Boston, Mass., for an Improvement in Skates:

I claim an improved skate as made with a reversible runner, one of whose opposite edges is plain, or not grooved, and the other fluted or grooved.

I also claim the improved mode of constructing a skate, viz.: with the plain and grooved runner bars, a b, connected only at their two adjacent ends, or as shown at c, and to the foot-rest, by projections or brackets, C D, so as to be movable relatively to such foot-rest and reversible, substantially in manner and for the purpose as specified.

I also claim extending each of the brackets, C D, from the upper bar of the runner down to the lower bar thereof, so as to support both of said bars, as described.

26,883.—R. P. Buttles, of Mansfield, Pa., for an Improved Animal Trap:

I claim the combination of the tipping bottom, the vertical rods and the sliding door, arranged substantially as described for the purpose as set forth.

I also claim arranging the points of suspension of the tipping bottom in such position as to require the animal to enter entirely within the trap before it is sprung.

26,884.—Thos. W. Carroll, of Baltimore, Md., for an Improved Self-lighting Lamp:

I claim the application of the lever and slide, as set forth.

26,885.—Lyman A. Clark, of Bridgeport, Conn., for an Improved Nut Cracker:

I claim the combination of the cam lever with the inclined plane, when these are combined with the vibratory and stationary jaws, and the whole is constructed, arranged and made to operate substantially as described.

26,886.—E. J. Cridge, of Troy, N. Y., for an Improvement in Cooking Stoves:

I claim the arrangement of the dampers or registers, f and g, or their equivalents, substantially in the manner and for the purpose set forth and described.

26,887.—John E. Crane, of Lowell, Mass., for an Improvement in Wire Screens for Cleaning Cotton. Ante-dated July 24, 1859:

I wish it to be understood that the improvement in cotton-cleaning trunks which I have invented, and desire to secure by Letters Patent, consists in the use of metallic screens in said trunks, when the said screens have been manufactured in such a manner as to remove the cracks, scales and other adhesive roughnesses from their surfaces, substantially as set forth.

26,888.—Thos. Connelly, of Philadelphia, Pa., for an Improvement in Burners for Vapor Lamps:

I claim, first, The combination of the annular perforated tube, A, with the outer vapor tube, G, its flared chamber, f, and inner vapor tube, D, when the said tubes are arranged in respect to each other and to the annular tube, A, substantially as and for the purpose set forth.

Second, The plate, m, attached to the inner tube, D, and arranged within the chamber, f, of the tube, G, as specified.

26,889.—Wm. Chesterman, of Centralia, Iowa, for an Improvement in Coffee Pots:

I claim the arrangement of the movable cylinder, C, in combination with the pot, A, cylinder, B, and piston-packed strainer, F, substantially as and for the purpose described.

[This invention consists in certain improvements on a coffee pot for which a patent was granted to the same inventor on July 19, 1859. The object of these improvements is to arrange the pot so that the grindings can be taken out without danger of mixing some of it with the liquid coffee. And this object is obtained by arranging the piston-packed strainer in a separate movable cylinder, which can be withdrawn whenever it is desired. The air tube which admits air to the pot is covered by the same cover that covers the spout.]

26,890.—Henry L. Cake, of Pottsville, Pa., for an Improvement in Coal Screens:

I claim casting the screen with "broken" or "staggering" bars, B, and continuous bars, A, substantially as and for the purpose set forth.

[The object of this invention is to obviate the difficulty hitherto attending the employment or use of cast iron coal screens, to wit, the large mass of metal required in proportion to the size of the meshes of the screen, and the consequent liability of the same to choke or clog. Cast iron screens are of course much cheaper than the woven wire ones, and would be universally adopted if it were not for the above-mentioned difficulty, which confines their use to those provided with large meshes. The invention consists in having the screen formed with one of its two series of bars "broken" or "staggering," as it is technically termed, that is to say, intersecting their crossbars, or bars of the other series, at such points that the row of "staggering" bars between two of the unbroken or continuous ones will be in line with the centers of the spaces between its adjoining rows; thereby forming meshes in one direction of the screen that are consecutively out of line and alternately in line with each other.]

26,891.—Geo. N. Cummings, of Meriden, Conn., for an Improved Catch for Spectacle Cases:

I claim forming a snap for metal boxes, such as spectacle cases, tobacco box, &c., by making corresponding indentations on the rim of the lid and on the side of the said boxes, in the manner and for the purpose set forth.

26,892.—Isaac T. Carpenter, of Martin's Ferry, Ohio, for an Improvement in Machines for Grinding Apples:

I claim the application of a grater or metallic sheeting, a a′, to the cylinders, C C′, said sheeting being perforated or punched with small holes, the rough and ragged projections of which are placed externally, and constitute the grinding surface of cylinders, C C′.

26,893.—John Donaldson, of Rockford, Ill., for an Improved Separator for Hominy Mills:

I claim the arrangement of the vibrating board, f, vibrating screen, i, vibrating elastic board, g, shell, A, fan, B, and screen, j, as and for the purpose shown and described.

[The object of this invention is to separate the hulls from the cracked or broken grain as the latter is discharged from the cracking apparatus. The invention is applicable to any mill for the purpose which has its discharge opening at the bottom of a stationary cylinder or shell. The invention consists in the employment or use of a fan and blast spout, screens and a rigid and flexible board, arranged relatively with each other and the discharge opening of the stationary cylinder or shell, so as to effect the desired result.]

26,894.—George W. Pittman (assignor to himself and Wm. C. Boone), of Bushwick, N. Y., for an Improvement in Machinery for Laying Rope:

I claim connecting two flyers in line by a central hollow journal, substantially as described, in combination with an arrangement of guides, substantially such as described, so as to carry the first strand from the first to the second flyer in a diagonal line, crossing the axis of rotation, whereby the several strands can be carried to the top with equal twist, as set forth.

26,895.—Caleb S. Davis, of Harrisburgh, Pa., for an Improvement in Machines for Finishing Cotton Goods:

I claim, first, The arrangement of the emery rollers and the cylinder brushes with the callender rollers, when either callender roller is filled with steam, substantially as and for the purposes specified.

Second, I claim the iron movable stretchers, the partial partitions in the dirt chambers and the steam chamber into which passes a perforated pipe for the purpose of infusing steam into said chamber; the same being arranged substantially as and for the purpose specified.

Third, I claim the arrangement of the emery rollers with the partial partitions in the dirt chambers.

26,896.—Jacob Dutcher, of Gibson, Pa., for an Improvement in Self-acting Wagon Brakes:

I claim the combination with the pole, H, and axle, A, of the racks, E E, and pinions, C′ C′, as and for the purpose shown and described.

26,897.—E. Wolcott Daniels, of Springfield, Mass., for an Improvement in Machines for Picking Millstones:

I claim the combination with the frame, L, of the additional frame, consisting of the bars, N O P, and the shaft, R, locking device, l, pinions, g g m m, and screws, Q Q, arranged and operating substantially as described, for the purpose specified.

26,898.—Linson D. Forrest, of Derby, Conn., for an Improved Method of Manufacturing Wooden Mosaics:

I claim the method of arranging, dividing, re-arranging and uniting woods of different descriptions or different colors, substantially as described, for the purpose as set forth.

26,899.—Elisha F. Edwards, of Le Roy, Ill., for an Improvement in Windmills:

I claim the arrangement of sails, a a a a, substantially as described, with the spiral springs, fusees, rods and cords, in the manner and for the purpose specified.

26,900,—Hervey W. Farley, of Hannibal, Mo., for an Improvement in Pressure Gages:

I claim the lever, L, and weight, W, or their equivalents, in combination with Bowden's pressure gage spring, S, in such a manner that the effect of any jar or external force upon the tube or spring, S, when in action, shall, in all positions of the spring, be counterbalanced or neutralized by the effect of the same jar or external force upon the weight, w, and the tube or spring be thus left to act undisturbed save by the pressure which is to be indicated, measured or regulated by the gage, thereby securing a more perfect operation of the gage and constant correctness of the indicator.

26,901.—Wm. L. Gold, of Alleghany, Pa., for an Improvement in Steam Engines:

I claim, first, The flanges, i, on the reversing crank or arm, h, and the projection, t, on the cam rod, e, when used for the purpose of guiding the hooks, 1 and 2, into their proper position on the wrists, 3 and 4, of the reversing crank or arm, h, as described and set forth.

Second, The use of the link, m, or its equivalent, when used in connection with the cam rods, f and g, reversing crank or arm, h, and the crank or arm, l, as described and for the purpose set forth.

Third, The use of the connecting rods, o and g, or their equivalents, when used in combination with the link, m, cam rod, e, and levers, p and r, as described and for the purpose set forth.

26,902.—Solomon S. Gray (assignor to himself and S. A. Woods), of Boston, Mass., for an Improved Planing Machine:

I claim the combination of the feed rollers, Q R, and bed, B, when used in connection with the mechanism composed of the shaft, L, provided with the pinions, D f, and the lever, O, provided with the pinions, g, and the pinion, l, on the roller, R, arranged substantially as shown, so that, by a simple adjustment, either the feed rollers, Q R, or the bed, B, may be driven as occasion may require.

I further claim the manner as shown of attaching the roller frame, P, to the machine, to wit, by means of the joint or pivot, k, so as to facilitate the adjustment of the rollers, Q R, as specified.

[An illustration and description of this invention will be found on another page of our present issue.]

26,903.—Joel B. Hayden, of Easton, N. Y., for an Improved Boot and Shoe Sole:

I claim the application of tempered steel for the outer soles of boots and shoes, as described.

26,904.—Wm. Wheeler Hubbell, of Philadelphia, Pa., for an Improvement in Projectiles for Fire-arms:

I claim, first, I claim the construction of the holes, k, and diagonal holes, j, so as to discharge the gas tangential to the cylindrical surface of the projectile, protected by the rear cylindrical surface, m, and in this manner rotate the projectile in the gun without increasing the ordinary windage, as described.

Second, I claim forming the circular recess, i, from the mouth of one diagonal hole, j, to the other entirely around them, in combination with the holes, k, and the cylindrical surface, m, so as to facilitate the rotation in the gun in this manner, as described.

Third, I claim constructing the holes, k and j, so as to discharge the gas tangential to the circumference opposite the corresponding faces, d, on the front, as shown, so as to have their re-active force of gas to coincide with the resistance of the faces, and in this manner operate with them to rotate the projectile in the same direction without rear grooves or increase of windage in the gun.

Fourth, I claim the expansible band, m n, secured by the recess, o, and flange, p, on the back part of the projectile, or its equivalent, in combination with the vents, j, so that the closing of the windage, by the band or ring behind the vents, shall compel a greater flow of gas to pass through the vents, j, and increase their rotative action, as described.

Fifth, I claim the combination of the radial surfaces, c, the curved surfaces, d, the sectional surfaces, a, and the cylindrical body, f, with the flat rear, h′, so as to cause the longest practicable bearing and the least shake or angular position of the projectile in the gun and the rotation, and by this steady position and rotative action acquire a true line of flight.

Sixth, I claim the extension of the carrying cylinder, r r, to the back part of the projectile, in combination with the metallic striker, x, the spaces, 4 4 4 4, Fig. 8, and the rear side orifices, v, so as to allow the projectile time to penetrate and the striker to effect its explosion.

Seventh, The flat sides or open spaces, 4 4 4 4, Fig. 8, between the striker and the cylinder to allow the air to pass through from rear to front and front to rear of the striker to facilitate its effective action in the cylinder.

Eighth, The seat of lead, u, at the base of the cylinder, to receive the striker as it recedes to the back part of the cylinder, and, by its non-elastic nature, prevent a reaction of the striker in the cylinder when the projectile starts in the gun.

Ninth, I claim the fulminate in the front end of the striker, in combination with the cylinder, the tube, w, the chamber, g, and the spaces, 4 4 4 4, Fig. 8, so as to carry the fulminate in the gun and cause it to explode the shell with certainty and ease on penetration, as described.

Tenth, The combination of the firing vents, v v, in the rear of the cylinder with the magazine of powder, y, in the striker, so that the striker, when it explodes the fulminate in the front of the cylinder, shall discharge a body of fire back in the cylinder, and through these firing vents, to explode the shell after a sufficient time has elapsed to allow it to penetrate.

Eleventh, I claim the wooden cylinder seat, s, in combination with the cylinder and striker, to steady the cylinder and receive the striker when starting in the gun; and also, I claim the auxiliary magazine of powder, t, in the cylinder seat, in combination with the striker, to facilitate the firing of the contents of the shell through the vents, v v.

Twelfth, I claim the point of metal, c, in front, in combination with the cutting edges, b, the radiating faces, c, the curved faces, d, and the sectional surfaces, a, so as to rotate and present the point foremost against an object, first puncture it at the center, and then cut and part it with the cutting edges and surfaces to enable the projectile the more readily to penetrate an iron vessel.

Thirteenth, I claim the combination of the lead filling, n, with the copper band, m, to prevent the leading of the gun when closing the windage, as described.

Fourteenth, I claim the combination of the two opposite lead screws, 2 2, with the cylinder and the striker forward of the center of gravity of the striker, so as to secure and release and allow the striker to operate without impinging on the cylinder as it is released, and without obstruction from the severed lead as it plunges forward, as described.

Fifteenth, I claim the peculiar construction of the projectile consisting of the combination of the point, e, the cutting edges, b, the radial faces, c, the curved faces, d, the sectional faces, a, the cylindrical body, f, the recess, i, the rotating vents, j, and flat rear, h′, forming one projectile capable of rotating in a smooth bored gun, and requiring initial velocity with diminished shake, of increasing its rotation in its flight, and of increased penetrative power.

26,905.—Danforth Johnson, of Chicago, Ill., for an Improvement in Springs for Railway Cars, &c.:

I claim the spring, A, composed or made up of one or more leaves, arranged or laid upon each other as described, when the power of pressure from within such circle is applied to elongate it, substantially as and for the purposes set forth.

I also claim, in combination with such spring, the use and application of the head blocks or parts, B C, or their equivalents, to elongate such spring, as and for the purposes set forth.

26,906.—A. F. Johnson, of Boston, Mass. (assignor to Alfred B. Ely, of Newton, Mass.), for an Improved Stitch:

I claim the stitch described, consisting of a chain-stitch having a binding thread passed through its loops, for the purpose described.

26,907.—Charles L. Kelling, of Mechanicsburg, Pa., for an Improvement in Preserve Can Covers:

I claim a flanged annular plate, A, which is constructed with ratchet teeth, C, lugs, a a (one or more), raised beads, D G, and one or more circular grooves or recesses, E H, between its inner and onter circumferences, in combination with a disk, I, which has a series of inclined planes, f f, a groove, e, and one or more beads, b d, and a spring pawl, J, or its equivalent, substantially as and for the purposes set forth.

[This is a very good, simple contrivance. It not only seals the can containing oysters or fruit hermetically or air-tight, by means of a double-joint rubber gasket and screw inclines, but also renders impossible the unsealing of the same by reason of undue internal pressure of the gases, or external jarring while on ship-board or being transported from one place to another. It also answers well for paints, leads and oils. In fact, to us, it appears to be just the contrivance.]

26,908.—Julius King, of Hoboken, N. J., for an Improvement in Valve Gear for Steam Engines:

I claim the combination with the movable toes, H I, attached as set forth to the valve rockshaft and sleeve, of two eccentrics, B C, arranged at right angles to each other, or thereabouts, on the crank shaft, or its equivalent, and having their rods connected with the rockshaft by means of a movable yoke, D, rod. E, and arm, F, and controlled by a guide block, r, and guide, d, or their equivalents; the whole operating as described for the purpose specified.

And I also claim combining the eccentric yoke, D, with the movable toes, H I, by means of the arms, H2 I2, links, h and i, nut, e, screw, f, rods, l n, and lever, K; the whole applied and operating as set forth to preserve a proper relation between the eccentric yoke and the toes.

26,909.—Joseph Kohnle, of New York City, for an Improvement in Pianoforte Actions:

I claim, first, The additional upright, C, containing the pivoted button, B, and the spring, D, attached to the jack of any of the usual actions, in the manner and for the purpose substantially as described.

Second, The construction of the second knuckle, F, of the hammer butt, consisting of separate and adjustable nuts and screws, substantially as represented in Figs. 2, 3, 4 and 5, for the purpose set forth.

26,910.—John K. Leedy, of Woodstock, Va., for an Improvement in Lamps:

I claim the arrangement of the alcohol lamp, B, the oil lamp, D, and the water cup, E, said cup being provided with one and the lamp, D, with two independent tubes which pass through them; the cup being situated above the lamp, D, and connected with it by means of a steam pipe, d, which passes into the tube, g; the whole being used substantially as and for the purpose specified.

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26,911.—Robert H. Long, of Philadelphia, Pa., for an Improved Arrangement of Steam Engines for Propelling Street Passenger Cars:

I claim, first, Placing a steam engine and boiler, constructed and arranged as described, on the platform of a city passenger railroad car, in a manner substantially as specified.

Second, Placing the pinion, F, upon the frame of the engine, thus permitting the engine to be brought close to its work; and the whole to be used in combination with a city passenger railroad car for the purposes set forth.

26,912.—Wm. Loyd, of New York City for an Improvement in Stereoscopic Instruments:

I claim, first, The use, in an instrument for the exhibition of stereoscopic pictures, of a belt formed as described, of leather, linen, or any suitable woven, felted or laid fabric.

Second, Making the prism of a stereoscopic instrument of glass or other transparent material, substantially as and for the purpose described.

26,913.—Ira Leonard, of Lowell, Mass., for an Improved Table Mat:

I claim a corrugated table mat, for the purpose and substantially as described.

26,914.—Robert O. Meldrum, of Griffin's Mills, N. Y., and Amos B. Paxson, of East Hamburgh, N. Y., for an Improved Clothes-wringer:

We claim the arrangement of the elastic pressure roller, D, spring, F, roller, H, the side pieces, J J, rollers, I I, and endless belt or apron, L, for the purposes of a clothes-dryer, substantially as set forth.

26,915.—Samuel G. Martin, of South Amboy, N. J., for an Improvement in Reefing Fore-and-aft Sails:

I claim reefing the sails of fore-and-aft rigged vessels by the arrangement of reefing lines and other operative means named, substantially as set forth.

26,916.—George N. Munger and George Munger, of New Haven, Conn., for an Improvement in School Slates:

We claim protecting the surfaces of slates by the use of india-rubber cord or other suitable material applied to the frame, or to the edge of a frameless slate, substantially in the manner described.

[This invention consists in applying to the ordinary wooden school slate, or to slates without frames, or to any description of writing tablets, a piece or pieces of india-rubber, cord, cork or other suitable material, so that said material will project from the surface of the slate or from the frame thereof, in such a manner that when the slate is placed on any plane surface the india-rubber (if india-rubber be used) will rest upon this surface instead of the frame or face of the slate, and the slate will thus be rendered comparatively noiseless.]

26,917.—Wm. McCord, of Sing Sing, N. Y., for an Improvement in Hay Presses:

I claim the packing head, G, hinged to the press box, and operated by lever, K, in combination with follower, D, when the same are all arranged so as to operate substantially in the manner for the purposes and upon the principles set forth.

[This invention and improvement in hay or cotton presses consists in arranging in the front part or head of the press box, in connection with an ordinary follower, a hinged gate or packer, and operating the same by means of levers, so as to pack the hay or cotton into the box and against the follower as the filling proceeds; the follower being alternately fixed and moved back by hand during this operation.]

26,918.—Samuel Rufus Mason, of Philadelphia, Pa., for an Improvement in the Ventilation of Bulk Windows:

I claim the combination of the inlets, E H'', outlets, F, and interior sash or door, M, with store bulks or other windows, substantially in the manner and for the purposes as described.

26,919.—William Hopkins Morris and Charles Liston Brown, of New York City, for an Improvement in Repeating Fire-arms:

We claim, first, The arrangement and combination of the chambers, c, whether movable or fixed, the plate, F, and bolt, H, substantially as and for the purpose shown and described.

Second, The arrangement and combination of the revolving pin, I, bolt, H, hammer, G, and plate, F, substantially as and for the purpose shown and described.

Third, The employment, in combination with a barrel, A, of a cone-shaped piece, B, having several passages, a a, starting from the base of said cone, and converging so as to discharge into the barrel, A, substantially as and for the purpose shown and described.

Fourth, The combination with the cone-shaped piece, B, of a cylinder, C, having chambers, c c, substantially as and for the purpose shown and described.

26,920.—Richard B. Pullan, of Cincinnati, Ohio, for an Improvement in Furnaces:

I claim the mutual arrangement of the furnace, E, with the coke furnaces, F and P, each operated in the manner and for the purpose set forth.

I also claim a rotary fire-bed, constructed and arranged in such manner that coals resting thereon, after having been charred in a front or first furnace, may be transferred to a second furnace by the rotary motion of the fire-bed, substantially as and for the purposes set forth.

26,921.—John L. Pott, of Pottsville, Pa., for an Improvement in Hoisting Apparatus:

I claim the sliding frame, H, with its pulleys, J and J', combined with the drum, G, and so actuated by the screw shaft, F, or its equivalent, as to control the position of the folds of the rope round the drum, in the manner and for the purpose specified.

26,922.—Bennett Potter, Jr., of Hubbardston, Mass., for an Improvement in Gunpowder Mills:

I claim the inclined revolving stirrer, in combination with the revolving hopper, operating in the manner substantially as set forth.

26,923.—Ebenezer G. Pomeroy, of New York City (assignor to J. B. & W. W. Cornell & Co., of same place), for an Improvement in Smelting and Refining Iron:

I claim the use of the ores of zinc, or the pure metal itself, in iron furnaces, at the same time that jets of steam or water are discharged into said furnaces, substantially in the manner and for the purposes set forth.

26,924.—Adolph Roda, of Rochester, N. Y., for an Improved Bed Fastening:

I claim the wrench lever, A, with flat reverse and inclined observe surfaces, turning on a center in the mortise of the post, in combination with the hooked bar or bolt, B, when immovably attached to the rail, and arranged to draw at right angles with the plane of the motion of said wrench, substantially in the manner and for the purposes set forth.

26,925.—Wm. Rice, of Philadelphia, Pa., for an Improved Curtain Fixture.

I claim the arrangement of the pulley, f, on the blind roller, the pulley, i i, and the endless cord, G, when the whole of the pulleys turn on fixed centers, when they are covered with gum elastic or other yielding material, as and for the purpose set forth.

26,926.—Andrew J. Ritter, of Rahway, N. J., for an Improvement in Attaching Thills to Vehicles:

I claim the combination of the clevis, C, and the thumb screw, D, with the shaft eye, K, and the half journal-box, H (which is secured to the axle of the vehicle); the parts K and H being so constructed that when the clevis, C, which is secured to the shaft eye by the bolt and nut, E F, is in the position shown in Figs. 1 and 2, the parts K and H will be coupled together; but when the thumb screw, D, is loosened, and the bottom of the clevis, C, is pulled forward and upward toward B, the parts K and H will be uncoupled.

26,927.—Wm. Rice, of Philadelphia, Pa., for an Improved Steam Generator:

I claim the box, G, its perforated wire gauze plates, f and h, the annular double cone-shaped gas chamber, H, its annular perforated gas tube, K, and the double cone-shaped chamber, L, when the whole is combined with, and arranged in respect to, the inner casing, C, and outer casing, A, and vents, x x, of the generator, as and for the purpose set forth.

26,928.—H. H. Richardson, of Barre, Vt., for an Improvement in Water Wheels:

I claim graduating the respective streams of water and projecting the same upon the buckets from chutes, of substantially the within-described shape, when the said chutes are so combined with the pivoted gates, h k, as to obtain the maximum of effect, substantially as described and for the purposes set forth.

In combination with the above-mentioned form of chute and gates, I also claim constructing the bucket wheel with the branching arms and disk-shaped floats, substantially in the manner and for the purpose set forth.

26,929.—John Roux, of New York City, for an Improvement in the Manufacture of Siccative Oils:

I claim the mode or method or chemical process by means of which I can give the common fish or whale oil the drying and other qualities now only found in vegetable oils, and which have heretofore rendered them preferable, and of superior value for painting and other similar uses.

26,930.—Mahlon Reeder, of Philadelphia, Pa., for an Improved Apparatus for Preserving and Discharging Malt Liquors:

I claim the application for preserving and discharging malt liquors of a vessel furnished with a suitable cock or cocks, and a tightly-packed piston, operated substantially as described for the purpose specified.

26,931.—George W. Robertson, of Philadelphia, Pa., for an Improvement in Hydrants:

I claim dividing the space between the casing of the hydrant and the water pipes into two chambers by means of the partition, h, the upper chamber terminating in a plate, g, and filled with a non-conducting material, and the capacity of said chamber being increased by means of the larged bore, f, and space, f', while the lower chamber formed between the partition, h, and the bottom board, k, contains no non-conducting material, but is fitted with an adjustable face board, a': the whole being constructed in the manner and for the purposes set forth.

26,932.—Richard A. Stratton, of Philadelphia, Pa., for an Improvement in Machines for Polishing Leather:

I claim attaching the agate to a vibrating arm, J, which is so controlled by an eccentric, K, or its equivalent, operated by, and moving simultaneously with the shaft which imparts the vibrating motion to the arm that the agate is depressed to the curved bed of the machine during the inward movement of the arm, and raised from the bed during its outward movement, as specified.

26,933.—J. Herbert Shedd and William Edson, of Boston, Mass., for an Improvement in Railroad Switches:

We claim the arrangement or device of deflecting one track from its true line, and putting permanently in the true line of that track the beginning of another line of track, substantially as described and show by the drawing A, for the purpose of taking advantage of the tangential or right line of motion of a car or engine for conducting the car or engine from one track on to the other.

26,934.—Francis B. Scott, of Buffalo, N. Y., for an Improvement in Ditching Machines:

I claim, first, The shields, B, at the side of the excavator wheel, as described.

Second, Attaching the clearers, which pass through the spades to an endless chain.

Third, The clearers, which clear themselves by being raised up through a slot or before a scraper by rollers or slides attached to the clearers, which run on an inclined plane or in a cam, substantially as specified.

Fourth, Making the frame in two parts with hinge joints and center shaft on line with hinge joints and the curved rack, for the purpose specified.

Fifth, The combination of the toothed rack, T T, with the excavator, for the purpose of a gage on the surface to determine the line of descent of the bottom of the trench, substantially as described.

Sixth, The combination of the V-shaped scraper, x, with the excavating wheel, A, substantially as specified.

26,935.—Jonathan Smith, of Dorchester, Mass., for an Improvement in Attaching Bonnets to Sails:

I claim the oval form of the grummet and the form of the knob attachment, and method of using them, as adapted to jibs or other sails.

26,936.—Levi S. Taylor, of Lamoille, Ill., for an Improvement in Clevis for Attaching Whiffletrees to Vehicles:

I claim the clevis, or its equivalent device, constructed substantially in the manner described and for the purposes fully set forth.

26,937.—Reuben Tower and Geo. E. Tower, of Ashtabula, Ohio, for an Improved Water Gage:

We claim the gage composed of a vessel, C, suspended on springs and connected with a boiler by flexible pipes, D E, and with an index by a rack and pinion, or their equivalent, and operating substantially as described, to show the condition of the water level in the boiler.

[This invention consists in a closed vessel suspended by springs and connected with the boiler above and below the proper water level by flexible pipes, and connected by a rack and pinion, or other equivalent means, with a suitable index. The water in this vessel being always on a level with that in the boiler, causes the vessel to fall and rise by the increase and diminution of its quantity as the water rises and falls in the boiler, and so to operate the index and show the quantity of water in the boiler.]

26,938.—Jasper Van Wormer, of Albany, N. Y., for an Improvement in Stoves:

I claim the construction of an air chamber whose perforated air-delivering surfaces or edges shall be formed into recesses with salient points projecting towards the center of the throat of the fire chamber, for the purpose of obtaining the largest space for the passages of gases from the fuel, in combination with the proper supply of air, to secure the most perfect combustion of the unconsumed gases and fuliginous matter, substantially as set forth in the above specification.

26,939.—Leonard J. Worden, of Utica, N. Y., for an Improved Fastening for Shoe Laces; ante-dated Jan. 3, 1860:

I claim securing shoe laces, in the manner set forth, by the use of the metallic fastener, A, when constructed and applied in the manner and for the purpose substantially as set forth.

26,940.—Calvin D. Wheeler, of New York City, for an Improved Belt Punch:

I claim the sliding rule provided with a measuring point, as described, in combination with a punch, substantially as set forth.

26,941.—John A. Wadsworth, of Providence, R. I., for an Improvement in Elastic Pessaries:

I claim the peculiar form and peculiar size, combined with great softness and elasticity of the cup.

I also claim the method by which the cup is kept in position, substantially as above specified.

26,942.—Theodore T. Woodruff, of Philadelphia, Pa., for an Improvement in Seats and Couches for Railroad Cars:

I claim the combination of the two sets of seat and back frames, arranged and combined with the car by supporting ways, substantially as described, so that when the said two sets of seat and back frames are opened out they shall constitute a couch suitable for two persons, as set forth.

And I also claim the combination of the two opposite frames, each connected with the car by means of hinged bars on which they slide, substantially as described, to form together an elevated couch, as set forth.

26,943.—Joseph Yarborough, of Milton, N. C., for an Improvement in Dressing Millstones:

I claim the arrangement of the main grooves, A, with radial branches, c, and tangential branches, d, in combination with the large grooves, f and h, and with the small grooves, e e' and g, to operate substantially in the manner and for the purpose specified.

[The grooves in this method of dressing millstones are so arranged that they can be made of considerable depth and that they allow the grain to spread over the whole surface of the stones, and at the same time they are brought in such relation to one another that no kernel is allowed to escape before it has been completely reduced.]

26,944.—Isaac Edelman (assignor to G. W. Edelman), of Philadelphia, Pa. for an Improved Water Closet:

I claim the arrangement of the three-way cock, I, having its plug central with the hinge of the lid, J, the vessel, N, and pipes, K L and M.

Second, The tube, P, with its notched end, in combination with the plate, Q, arranged within the basin, as set forth, for the purpose specified.

26,945.—George K. Farrington (assignor to himself and George H. Read), of Xenia, Ohio, for an Improvement in Coffee Pots:

I claim the arrangement of the apertures, d d, in the sides of the condenser, B, at a uniform hight and in such relation to the bottom of the inverted cup, D, as to keep the condensing water at a constant hight, and low enough to allow the steam to escape at a pressure ordinarily obtained in the coffee pot, in combination with the vent apertures, m p, or their equivalents, substantially as and for the purpose specified.

26,946.—Henry W. Henley, of New York City (assignor to Albert Palmer, of Jersey City, N. J.), for an Improved Ventilating Bedstead:

I claim combining one or more fan or fans with the mattrass formed of the serrated sections or its equivalent device, when the same shall be arranged and operated in the manner described and for the purpose specified.

26,947.—Andrew Hunter, of Hereford's, Va. (assignor to himself and Peter Hunter, of Adams county, Ohio), for an Improved Rat Trap:

I claim the arrangement of the bell crank, G, in connection with the drop gate, D, and platform, F, substantially as and for the purpose set forth.

Second, I claim the combination of the mechanism by means of which the animal is made to reset the trap, consisting essentially of the tilting platform, K, escapement, M, escapement wheel and axle, N, cord, Q, and weight, P, substantially as described.

26,948.—A. F. Johnson, of Boston, Mass. (assignor to A. B. Ely, of Newton, Mass.), for an Improvement in Sewing Machines:

I claim the rotary hook constructed as described or in any manner equivalent thereto, in combination with a needle and bobbin, for the purpose of forming a seam by the interlacing of two threads, as set forth.

Second, I claim the shoulder, t, or its equivalent, for the purpose of preventing the point, i, from being entangled with the old loop, as set forth.

Third, I claim passing that portion of the loop that lies in the groove, n, or around the periphery of the hook during the first portion of its revolution, behind the bobbin, as set forth.

26,949.—Wm. Lewis, of Brooklyn, N. Y. (assignor to M. J. Drummond, of New York City), for an Improved Method of Attaching Scabbards to Belts:

I claim the escutcheon, a, receiving the button, c, on the sword case, when combined with the spring latch or its equivalent passing over the shank of the button, as and for the purposes specified.

26,950.—Allen Lapham, of Brooklyn, N. Y. (assignor to himself and C. A. Durgin, of New York City), for an Improved Steam Trap:

I claim, first, Arranging and combining with a float, operating as described, the channels for the introduction of steam, whereby I am enabled to equalize the pressure upon the float, substantially as set forth and specified.

Second, I claim combining with a vertical rod a float which moves upon said rod and operates the valves by mechanism, substantially as set forth and specified.

Third, I claim combining with a float operating as described, a double or compound valve, substantially as set forth and for the purposes specified.

Fourth, I claim combining with a float having a movement independent of the valve rod, the mechanism described (or its equivalent) for operating the valves, substantially as set forth and specified.

26,951.—John E Neill, of the United States Navy (assignor to E. S. Pomeroy, of New York City), for an Improved Wrench:

I claim the use of the jaw, B, in combination with the collar, C, when said jaw is constructed and operated in the manner specified.

26,952.—George Neilson, of Boston, Mass. (assignor to Holmes, Booth & Hayden, of Waterbury, Conn.), for an Improvement in Lamps:

I claim an improved lamp cone or deflector, as made with its lip or flanch corrugated or formed with ridges to support the chimney, and not only form air passages underneath its lower edge, but to direct and insulate the several currents under the chimney, as stated.

And in a cone or deflector so made I claim constructing each chimney-supporting corrugation concave on its underside, and with a closed outer end, as specified.

26,953.—George K. Proctor (assignor to himself and G. H. Stickney), of Beverly, Mass., for an Improved Lamp-lighting Device:

I claim the partially rotating and yielding plate, E, operated by the spring, D, or its equivalent, and attached to the shaft, C, in connection with the hook, j, also attached to shaft, C, the catch, n, on lever, G, and the match-holder, e; the latter being arranged rela-

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tively with the wick tube, d, of the lamp, substantially as and for the purpose set forth.

I also claim the extinguisher, H, attached to the rod, I, in connection with the crank, k, on the rod, F, arranged substantially as shown to insure the exposure of the wick, simultaneously with the ignition of the match, g.

26,954.—James W. Peck, Jr. (assignor to himself and L. B. Hawxhurst), of Brooklyn, N. Y., for an Improved Helical Spring:

I claim the corrugated or zig-zag wire spring herein described as a new article of manufacture.

26,955.—Joseph Smith (assignor to himself and Robert R. Lynd), of Cincinnati, Ohio, for an Improvement in Shears:

I claim the oblique guide slots, e, guide pin, E, and wrist, F, constructed, combined and operating in connection with the blade, D, and handle, d, substantially as and for the purposes set forth.

Second, The construction and combination of the dovetailed back, a, stub, J, and movable bit, H, of the blade adapted in the manner set forth to preserve the original length and breadth of the blade, and the position of its cutting edge.

26,956.—Joseph Steger, of Mattewan, N. Y. (assignor to James M. Frear, of Peekskill, N. Y.), for an Improved Device for Attaching Spirit Levels to a Square:

I claim a level constructed as set forth, so as to be adjusted to an ordinary square in the manner shown.

26,957.—Joshua Turner, of Cambridgeport, Mass. (assignor to himself, J. T. Bartlett and E. E. Butman, of Boston, Mass.), for an Improved Glue Pot:

I claim the improved article of manufacture or glue pot constructed not only with one or more steam escape passages, a, leading out of the space between the glue holder, A, and the water vessel, C, but with a steam retainer and condenser, D, applied to cover both vessels, A and B, and operate therewith, substantially as specified.

And in conjunction therewith, or with a glue pot made with the vessels, A B, and cover or condenser, D, arranged and connected by one or more passages, a, as described, I claim the sponge receiver or water and sponge heater, K, arranged therewith, substantially as specified.

26,958.—Sylvenus Walker (assignor to W. B. Spence), of Boston, Mass., for an Improved Egg-beater:

I claim the arrangement and combination of the oblique rack and pinions operating in the manner and for the purpose substantially as set forth.

26,959.—Zachariah Walsh (assignor to C. Walsh), of Newark, N. J., for an Improvement in Locks for Carpet Bags:

I claim the combination of the slide, C, with one or more spring catches, D E, placed within a suitable case, A, and arranged to operate with the shackles, f f, substantially as and for the purpose set forth.

[This invention consists in combining one or two spring catches or bolts with a slide, whereby the bag may not only be locked at or near each side consecutively and thereby obviate the difficulty attending the forcing or pressing together of the bag at both sides at once in those cases where the bag is locked at both sides simultaneously, but also enabling both catches or locks to be unlocked simultaneously with but a single operation of the key.]

26,960.—Norman Wiard, of Janesville, Wis. (assignor to J. Townsend, of New York City, as his trustee), for an Improvement in Locomotive Vehicles for Running on Ice or in Water:

I claim, first, The combination of the following elements, viz, a water-tight boat capable of floating on runners or skates, to run on ice, and sustain the boat thereon, and so connected with the boat as to turn for steering, substantially as described, and a single traction or propelling wheel placed centrally between the runners or skates, to act on the ice, for the purpose of propelling the boat when its runners or skates rest on the ice, substantially as described. I am aware that the traction wheels fast on one and the same driving axle, have been combined with runners and a boat; but in such case the runners were not swiveled to the boat, to change the direction of the line of travel, and the two wheels being fast on the same axle would resist any means employed for steering; and hence I do not wish to be understood as claiming, broadly, the combination of traction wheels with runners or skates and a boat, but to limit my claim to the combination above stated.

Second, I also claim combining the traction or propulsion wheel and the boat by interposed springs or equivalents thereof, that the wheel may be self-adapting to any inequality of surface whilst the runners rest on the surface of the ice, as set forth.

Third, I also claim, in combination with the boat and runners or skates the mechanism substantially as described, for lifting the runners from the ice, by lifters which sustain the weight, substantially as described, whereby the runners can be prevented from becoming fastened by frost to the surface of the ice, when at rest, as set forth.

Fourth, I also claim the stationary runners attached to the bottom of the boat, in combination with the movable runners or skates at the sides, substantially as and for the purpose set forth.

Fifth, I also claim constructing the traction wheel, substantially as described, that is, with its periphery a sharp cutting edge, to penetrate into the ice, to prevent the boat from moving sideways, and thereby admit of using runners smooth or rounded, when such periphery is combined with lateral projecting wings having cutting edges to penetrate into the ice and take hold therein from traction, substantially as described.

Sixth, So connecting each of the movable runners or skates with the boat that each may turn in a horizontal plane on an axis, substantially as and for the purpose described.

Seventh, I also claim combining with the turning runners or skates and with the steering chains, the tension or adjusting blocks, or equivalents, substantially as and for the purpose specified.

Eighth, And I also claim connecting the ice-penetrating brake by a hinged rod or arm to the boat, substantially as described, in combination with the connection of it by the toggle-joint lever, or the equivalent thereof with a steam piston, substantially as and for the purpose specified.

26,961.—H. S. Schell, of Philadelphia, Pa., for an Improvement in Creepers to Prevent Slipping on Ice:

I claim, first, The pin, D, or any other contrivance essentially the same, by which the side pieces, B and C, are prevented from revolving backwards.

Second, The adaptation of the pole and pin, E, or screw, H, to the plate, A, or any arrangement substantially the same by which the the creeper is secured.

Third, The mode of attaching the creeper to the heel, viz., by pushing the points of the plates, B and C, as far forwards as possible, and then forcing the bent end of it over the front of the heel, substantially as before stated.

RE-ISSUES.

C. L. Crowell and Robert Smith, of Peoria, Ill., assignees of Wm. Massey, of Greene Co., Ill., for an Improved Machine for Contracting the Circumference of Wrought Iron Bands. Patented July 3, 1849:

We claim, first, The combination of two clamping jaws, or their equivalent, arranged substantially as described, so that a bend or bar held by these jaws is caused to be contracted or upset in length by their movement towards each other, for the purpose set forth.

I also claim, in combination with the clamping jaws, a mold or matrix, or its equivalent, arranged between the jaws, substantially as described for the purpose set forth.

And I further claim, in combination with the clamping jaws, the adjustable rest, E, or its equivalent, arranged substantially as described, to support one side of the bar.

C. L. Crowell and Robert Smith, of Peoria, Ill., assignees of Wm. Massey, of Greene Co., Ill., for an Improved Machine for Contracting Metal Bands. Patented July 3, 1849:

We claim the method of upsetting or shortening by compression, bands or bars of metal by clamping the bar or band rigidly on either side of the point at which it is to be upset, and then moving the clamps towards each other, substantially as described.

I also claim the method of giving the required form and size and shape to a metal band or bar while being upset, by clamping it on either side of the point at which it is to be upset, and forcing it by moving the clamps towards each other in a mold or matrix, substantially as described.

Lucian Fay, of Cincinnati, Ohio, for an Improved Machine for Seaming Sheet Metal Roofs. Patented July 28, 1857:

I claim, first, A suit of seaming rollers, mounted in a carriage and operating by the described continuous movement, to produce a standing seam of even hight on stationary sheets of metal.

Second, Adapting a seaming carriage, substantially in the manner set forth, to produce a standing seam without other guide than the upturned edges upon which it operates.

Third, In the described combination with the seaming mechanism, the pioneer rollers, a a', operating in the manner and for the purposes set forth.

Fourth, The described arrangement and application of a folding roller, c, operating to turn or fold the edge of the metal from a right to an acute angle, preparatory to the action of the seaming or closing rollers, as set forth.

Fifth, The burring, folding, and slaming rollers, constructed, arranged and operating substantially as set forth, to complete a single or double standing seam at one operation.

Sixth, Arranging the seaming rollers against yielding bearings, substantially as and for the purpose set forth.

Seventh, Making the operative mechanism of a seaming carriage, adjustable in hight, for the successive operations of a single and double seaming, as set forth.

Eighth, The operator's seat, applied to a seaming carriage, substantially as and for the purpose set forth.

Ninth, The stirrups, i, constructed and applied substantially as and for the purposes set forth.

EXTENSION.

Wm. Fosket, of Meriden, Conn., for an Improvement in Machinery for Making Hat Bodies. Patented Jan. 23, 1846. Re-issued March 23, 1858:

I claim the described automatic method of forming hat bodies, having the required variation in thickness at their different parts by supplying picked fibers to an exhausted former of the size and shape required in such manner that a larger portion of picked fibers is supplied to that part of the former, which corresponds with the thickest portion of the hat body, and a less portion to the other parts of the former, substantially as set forth.

I also claim the combination of a picking apparatus, a hat body former, an air-exhausting apparatus and a conductor, the whole combined substantially at set forth.

I also claim a bow-string picking apparatus, constructed and operating substantially as set forth to pick fur presented to it by a suitable feeding and nipping apparatus.

DESIGNS.

P. C. Cambridge, Jr., of Enfield, N. H., for a Design for Bedsteads.

N. Ezekiel, of Richmond, Va., for a Design for a Trade Mark.

Abel Gray, of Wappinger's Falls, N. Y., for a Design for Back Combs.

Birdsill Holly, of Lockport, N. Y., for a Design for Cistern Pumps.

T. W. Lillagore (assignor to Savery & Co.) of Philadelphia, Pa., for a Design for Fire Dogs.

H. G. Thompson, of New York City, assignor to the Hartford Carpet Company, for a Design for Carpet Patterns. (2 cases).

Notes & Queries

L. L. S., of Ala.—We regard the fact of the tides being caused by the sun and moon as nearly demonstrated as anything can be, except a mathematical proposition. We do not know of any reward being offered for squaring the circle.

J. G. G., of Ark.—We think that gun-metal makes the most durable bushes or journal boxes that can be used for grist mills.

J. D., of Ky.—The steel which you endeavored to enamel and failed in so doing, with borax and smalts, was perhaps not perfectly polished on the surface. We do not know any other reason for the failure. Mix a little gum arabic with the borax and try again. By perseverance you will attain the desired result. Do not use a too high heat.

A. D. L., of N. H.—A diamond point, used as a drill, will perforate through the hardest file. A good hard common steel point will also drill through a file, if you give it a high velocity and use plenty of cold water to keep it cool.

D. B., of C. W.—We have been informed that ventriloquial powers may be acquired by practice, but as we are not adepts in such vocal operations we recommend you to apply to some professor of the art for instructions.

A. Q., of N. H.—Clockwork has been driven by the expansions and contractions of a long iron rod, which resulted from the varying temperatures of night and day. The compound blowpipe would be totally unsuited for your purpose. It consists of one vessel containing pure oxygen and another, twice the size, filled with pure hydrogen gas. The gases are brought together as they escape from the jet, and ignited. The procuring of these gases is costly and the methods too complicated to be described in this column.

G. P. W., of R. I.—Your account of the coal tar killing part of the young elms and maples to which it was applied corresponds with results in other places. There seems to be no doubt that it is a dangerous practice.

W. A. M., of Mass.—By mixing plaster-of-Paris and blacklead with india-rubber it will become hard and stiff, and may suit your purpose. Some of the numbers of Vol. XIV. of the Scientific American are out of print.

J. O., of Wis.—By adding a small quantity of alcohol to your ink it will be made to flow freely. Be careful not to add too much or it will trickle off the pen too readily and make blots in the writing.

G. W. G., of Mass.—If you will give us your name, we will write you a letter about your lantern.

G. M., of N. Y.—The scale formed in steam boilers is derived from both sulphate and carbonate of lime in the water. The carbonate is deposited when the boiler becomes cold after the free carbonic acid is driven off by the heat. As you state, if free carbonic acid were supplied to the boiler, the deposit of carbonate would not take place, but this would not prevent the scale of sulphate forming. It is very easy to keep a boiler free from deposits of carbonste; all that is required to do this is to allow the boiler to cool down to 100° at night, when the carbonate will settle loosely to the bottom, and it may then be run off by a pipe in the boiler bottom.

J. H. C., of Mo.—There are no means of preventing the gallic acid of oak blocks, which are boiled in a boiler, from acting upon the iron and eating it, because this acid is a powerful solvent of iron. As you require to boil the oak timber for making shingles in your mill, you can easily avoid boiling it in the boiler and obtain the same results. Make a strong and long water-tight wooden tank and fill it nearly full of water; then lead the steam from the boiler, by a pipe, into this tank, and thus boil the water in which your oak timber may be placed. All the extra expense required will be for the tank; no more fuel will be consumed than by your present mode of boiling, if, as we understand you, a common steam boiler is employed,

F. H. C., of N. Y.—There is no stated degree of temperature at which glass fuses, because its point of fusion depends entirely upon its composition. Quartz—its base—is infusible, and it only melts by being combined with soda, lime and other alkali, and sometimes a mixture of lead. The prevailing temperature of glass furnaces is 21,632° Fah. A siphon may be employed to turn a small wheel; its power depends on the quantity of water which flows through it and the hight of the eduction pipe.

E. S., of Conn.—Your suggestion to us, to use common words (in our articles) that all can understand, relates to a matter which we have fully considered and endeavor to bear constantly in mind; but we do not object to being reminded of it anew. We are well aware this is the only way to maintain our large circulation. We are always pleased to receive the accounts of practical experiments like that of yours of putting an equal quantity of castor oil in your solution of india-rubber in turpentine for a dressing for boots, especially when the experiment was successful, as in your case.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Jan. 28, 1860:—

F. J. H., of N. Y., $25; T. J., of N. Y.., $50; P. M.. of La., $50; J. M., Jr., of Ill., $10; F. & B., of N. Y., $55; G. W. G., of N. Y., $30; C. J., of Mo., $80; V. D., of N. Y., $100; R. W. F., of Mo., $30; J. B. J., of Mass., $30; A. R. W., of Pa., $10; W. J. J., of Mass., $55; E. C. B., of Ala., $25; J. H., of Ill., $30; D. G. F., of Wis., $25; J. Van V. of N. Y., $30; M. S. P., of Mass.. $30; H. H., of N. Y., $25; H. & P., of N. Y., $100; W. T. L., of Mass., $30; J. C. S., of Mass., $99; R. J. G., of Ind., $77; A. P., of Ala., $25; J. M. D., of N. Y., $25; P. S., of N. Y., $25; G. B. S., of N. C., $25; J. M., of Ala., $53; D. J. V., of Ill., $30; C. B. M., of N. Y., $55; J. A., of Vt., $30; W. E. B., of N. Y., $35; D. P. F., of Wis., $30; G. W., of N. Y., $55; R. S., of N. Y., $25; G. W. R., of N. Y., $60; G. M., of Conn., $30; J. H. N., of N. Y., $25; C. H. D., of Mass., $25; C. S., of Conn., $30; T. L., of Ill., $30; W. E. R., of Mass., $30; N. & H., of N. J., $30; D. A., of Mo., $120; R. H. F., of N. J., $30; T. B. McC., of Pa., $20; J. H. E., of Ill., $25; J. F. C. P., of N. Y., $25; C. G. M., of N. Y., $20; G. C. D., of Ohio, $25; A. C., of N. Y., $55, T. S., of N. Y., $55; J. H. McC., of N. Y., $57; H. A. J., of Mo., $30; J. C., of Conn., $40; J. T., of L. I., $30; A. B. H., of Fla., $10; W. S., of Pa., $50; W. D. G., of N. J., $30; M. M., of N. Y., $50; T. S., of Conn., $25; W. W. G., of Ill., $25; C. H. E., of Vt., $25, W. B., of Pa., $30; L. S. A., of Ind., $30; J. T., of N. Y., $30; G. W., of Conn., $25; W. H. S., of R. I., $40; G. W. R. B., of La., $70; T. F., of N. Y., $20; F. F. M., of N. Y., $152; O. J. Van W., of N. Y., $25; F. & S., of N. Y., $65.]

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Jan. 28, 1860:—

F. J. H., of N. Y.; H. M., of Ohio; J. H. E., of Ill.; G. C. D., of Ohio; P. & H., of N. Y.; J. M. D., of N. Y.; C. H. D., of Mass.; J. H. N., of N. Y.; W. S., of Pa. (2 cases); J. C., Jr., of N. Y.; H. H., of N. Y.; F. F. M., of N. Y.; J. F. C. P., of N. Y.; W. C., of N. Y.; T. L., of Ill.; F. & S., of N. Y.; A. P., of Ala.; E. J. H., of N. Y.; C. E., of N. J.; J. C., of Conn.; D. G. F., of Wis.; J. H., of Ill.; C. H. E., of Vt.; T. L., of N. Y.; W. H. S., of R. I.; F. & B., of N. Y.; W. B. G., of N. Y.; T. S., of N. Y.; E. C. B., of Ala.; J. R. E., of La.; T. S. W., of N. Y.; R. S., of N. Y.; L. F. F., of N. J.; W. W. G., of Ill.; T. S., of Conn.; C. C., of N. Y.; D. A., of Mo. (3 cases); J. C. S., of Mass.; C. J. Van W., of N. Y.; C. G. M., of N. Y.; G. W., of Conn.

Literary Notices.

New American Cyclopœdia, Vol. VIII. D. Appleton & Co., Nos. 346 and 348 Broadway, this city.

We have just received the eighth volume of this most valuable work. No man can fully appreciate the difference in the condition of a family of children brought up with a good cyclopœdia in the house, and of one reared without access to such a means of acquiring knowledge on all the various subjects which occur to the mind or are suggested by reading or conversation. Besides numerous articles in the departments of biography, geography, history, literature, &c., we observe that the eighth volume treats of the following subjects, which are of special interest to our class of readers:—Robert Fulton, galvanized iron, gas as fuel, Gay-Lussac, artificial gems, enameled glass, soluble glass, glass paper, gold-beating, gravity, grenade, grindstone, guano, guinea, gum tragacanth, gum kino, gun cotton, gunnery, gunpowder, Edward Gunter, Gunter's chain, Gunter's line, Gunter's quadrant, gutta-percha, gyroscope, hail, hair, halibut, Hamlet, hammer, harem, &c. Such of the articles as we have read we have found remarkably well written; and, as a specimen, we give, on another page, the one on "Gun Cotton."

The Atlantic Monthly. Ticknor & Fields, publishers, Boston.

The February number of this magazine is received. It fully maintains its sparkling character under its new publishers.

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THE BUILDING NEWS—A WEEKLY JOURnal for the builder, architect and dealer in real estate; $2 per annum. Published by JOHN HILLYER, No. 120 John-street, New York. 5 1*

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FOR SALE—A FEW STATE RIGHTS OF Hawkins' Rotary Steam Plow, an engraving and description of which is given on page 65 of this paper. Address proposals to JAS. HAWKINS, Braddocksfield, Alleghany county, Pa. 5 3*

SALE OF VALUABLE REAL ESTATE.—THE Washington Iron Works offer for sale the following valuable property, immediately on the banks of the Hudson river, in the town of Newburgh, N. Y., consisting of a substantial three-story brick building, 105 by 32 feet, with an attached building of wood, one-story, 48 by 30 feet; also, another brick building 46 feet square, open to the roof, with a wing of brick 57 by 30 feet (one-story); all of the above brick buildings having good slate roofs. Also, sheds, wooden buildings, stable, yard, &c., with all the ground occupied by the above. The foregoing property fronts on the river 210 feet, forming an excellent wharf of that extent, having 13 feet at high water throughout. The whole has been heretofore known as the "Highland Iron Works," is in good order, and would form good accommodations for a factory, flour mills, &c., &c. The entire property can be had at a great bargain for $25,000. 5 3*

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NEW YORK, Jan. 24, 1860.
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*** See notice in SCIENTIFIC AMERICAN of this week. 1*

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Auf der Office wird deutsch gesprochen.

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NEW YORK MACHINERY DEPOT.—MILBANK & ANNAN (successors to A. L. Ackerman), manufacturers and dealers in Woodworth Planers, Wick's Patent Re-sawing Machines; Sash, Door and Blind Machinery, Steam-engines and Boilers, Machinists' Tools, Files, Leather and Rubber-belting, and findings of every description, No. 222 Pearl-street, New York. 1 7*

AMESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise, et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence.
MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

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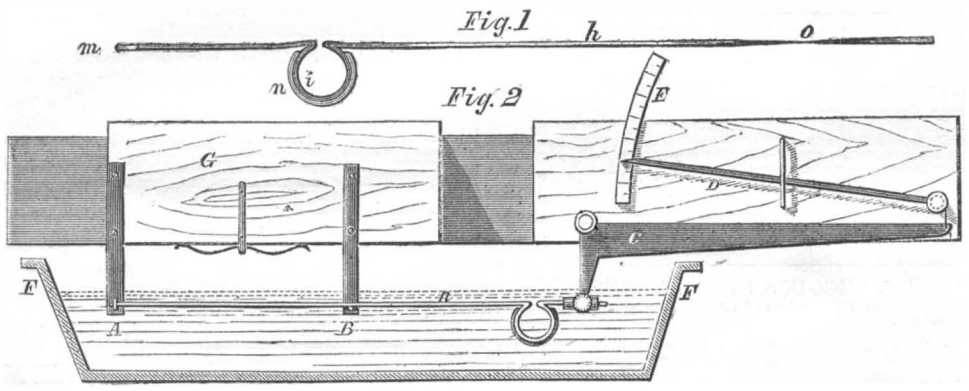
IMPROVED COMPENSATING PENDULUM.

About 230 years ago, Galileo, the great astronomer and mathematician, while sitting in a church in Florence, happened to notice the swinging of a lamp which was suspended by a long chain from the ceiling. As the oscillations became shorter, he observed that the motion grew slower, and it occurred to him that perhaps the vibrations of a pendulum occupied precisely the same length of time whether it swung through a greater or less distance from the perpendicular. On trying the experiment carefully at home he found that his surmise was correct, and the truth of this singular law having been fully established, the pendulum is now universally regarded as the best of all mechanical means of measuring time. Connected with weights by an escapement device, its oscillations are made perpetual, and it regulates the movements of clocks with surprising precision. This regularity of movement, however, is subject to one cause of disturbance which is in perpetual operation. Though the time occupied in the vibration of a pendulum is not varied in the least by the length of the arc through which it swings, it *is* varied by the slightest change in the length of the pendulum rod; a short pendulum making more vibrations in a given time than a long one. As rods, of whatever substance made, vary in length with the changes in the temperature or moisture of the atmosphere, it has been found practically almost impossible to construct a pendulum which will always preserve the same length, and which will, consequently, have absolutely isochronal oscillations. Innumerable plans have been tried for so constructing a pendulum that the expansion in one direction should be compensated for by counteracting expansion in the opposite direction, and thus the length of the pendulum be preserved. One of the latest, and perhaps the very simplest, of all these plans is illustrated in the annexed cut.



BEMIS' NEW COMPENSATING PENDULUM.

It consists simply of an iron rod, *h*, Fig. 1, which is to be suspended at *o*, and to have the bob at its lower end, *m*. Near its lower end it is bent in part of a circle *i*, which has the brass piece, *n*, soldered upon the outside of the curve. As the expansive power of brass, compared with iron, is as 8 to 5, when the temperature rises and the rod, *h*, is lengthened, the brass, *n*, being lengthened more than the iron inner part of the ring, *i*, partially closes the opening in the ring, thus tending to shorten the rod and compensating for the expansion in the rod. As this compensating effect is in proportion to the size of the bent curve, the latter must be adjusted to the length of the rod. In order to test this adjustment with great nicety, the apparatus represented in Fig. 2 has been devised.

The pendulum rod, *h*, is rigidly secured at one end, A, with its middle supported by the pin, B, and its opposite end attached to the short arm of the bent lever, C. The long arm of the lever, C, is connected by a chain to the short arm of the lever or index, D, the end of which vibrates over a graduated arc, E. The pendulum thus arranged is dipped alternately in hot and cold water, when the slightest change in its length is multipled and plainly indicated by the movements of the index over the graduated arc. The part, G, slides back and forth to adjust it to pendulums of different lengths.

This is the invention of a practical clockmaker, who says that he is constantly trying it, and that when the size of the bent segment is properly adjusted to the length of the pendulum, the compensation is very accurate indeed. The patent was issued Nov. 8, 1859, and persons desiring further information in relation to the matter will please address the inventor, Merrick Bemis, at Ashburnham, Mass.

PLAIN DIRECTIONS FOR MAKING A HORIZONTAL SUN-DIAL.

There are many forms of sun-dials, but as the horizontal is the one most generally in use, a description of that will be of most practical value. A suitable material is either cast iron or bronze, and though the dial consists of two parts, they are to be cast together in one piece. The dial plate may be a simple plate of metal, say one quarter of an inch thick, and from four inches to a foot square. On this is to be erected the gnomon, a triangular plate of metal, also about one quarter of an inch in thickness, with its perpendicular edge rising from the back side of the dial-plate, and its acute angle near the front edge of the dial. This acute angle must correspond with the latitude; that is, if the latitude is 42°, the angle which the inclined edge of the triangle—called the "style"—makes with the plane of the dial-plate must be 42°. The dial-plate must be placed exactly level, with the plane of the gnomon precisely in a north and south direction; this brings the style or edge which casts the shadow parallel with the axis of the earth, that is, pointing to the poles of the heavens. Now, all that is required is to draw the hour lines on the dial-plate, where the shadow of the style will fall at the several hours of the day. These vary with the latitude, and may be computed by the following theorem in plane trigonometry. As is the radius to the sine of the latitude, so is the tangent of the hour from noon (reckoning 15° to the hour) to the tangent of the hour angle at the center. We give a table of these angles for the even degrees of latitudes from 35 to 43, which embraces the larger portion of the United States:—

A.M.	P.M.	35°	36°	37°	38°	39°	40°	41°	42°	43°
XI.	I.	8°44	8°57	9°10	9°23	9°34	9°46	9°58	10°10	10°21
X.	II.	18°20	18°45	19°10	19°34	19°58	20°22	20°45	21°7	21°29
IX.	III.	29°50	30°27	31°2	31°37	32°11	32°44	33°16	33°47	34°18
VIII.	IV.	44°49	45°31	46°11	46°50	47°28	48°4	48°39	49°13	49°45
VII.	V.	64°27	65°29	66°	66°29	66°56	67°22	67°47	68°11	68°33
VI.	VI.	90°	90°	90°	90°	90°	90°	90°	90°	90°

As the sun is sometimes too fast and sometimes too slow, the time, as shown by the dial, is not always right. A table for corecting the dial time should be cast or engraved on each instrument. We append the proper table for this purpose, taken from the *American Almanac* for 1860, and verified by standard works on astronomy. In order to obtain the true time from the dial time, on—

Jan.	2,	add	4 min.	Apl.	28,	sub.	3 min.	Sept.	28,	sub. 10 min.
	4,	"	5 "	May	6,	"	4 "	Oct.	2,	" 11 "
	6,	"	6 "		24,	"	3 "		5,	" 12 "
	8,	"	7 "	June	2,	"	2 "		8,	" 13 "
	11,	"	8 "		8,	"	1 "		12,	" 14 "
	13,	"	9 "		12,	"	0 "		17,	" 15 "
	17,	"	10 "		18,	add	1 "		22,	" 16 "
	19,	"	11 "		22,	"	2 "	Nov.	14,	" 15 "
	22,	"	12 "		26,	"	3 "		19,	" 14 "
	26,	"	13 "	July	2,	"	4 "		23,	" 13 "
	30,	"	14 "		8,	"	5 "		26,	" 12 "
Feb.	26,	"	13 "		14,	"	6 "		29,	" 11 "
	29,	"	12 "	Aug.	8,	"	5 "	Dec.	2,	" 10 "
Mar.	6,	"	11 "		14,	"	4 "		4,	" 9 "
	10,	"	10 "		19,	"	3 "		6,	" 8 "
	14,	"	9 "		23,	"	2 "		9,	" 7 "
	18,	"	8 "		26,	"	1 "		11,	" 6 "
	20,	"	7 "		30,	"	0 "		13,	" 5 "
	24,	"	6 "	Sept.	3,	sub.	1 "		15,	" 4 "
	28,	"	5 "		5,	"	2 "		17,	" 3 "
	30,	"	4 "		8,	"	3 "		19,	" 2 "
Apl.	4,	"	3 "		11,	"	4 "		21,	" 1 "
	6,	"	2 "		14,	"	5 "		23,	" 0 "
	9,	"	1 "		17,	"	6 "		25,	add 1 "
	14,	"	0 "		19,	"	7 "		27,	" 2 "
	18,	sub.	1 "		22,	"	8 "		30,	" 3 "
	20,	"	2 "		25,	"	9 "			

A time-ball is to be erected on the top of the Custom House in this city, and it will be elevated to such a hight as to be seen from vessels in the bay. It will be secured by a trip catch on a pole, which will be detached by an electro-magnete very day at noon exactly, when the ball will descend. The electro-magnet will be operated by an electric wire from the Dudley Observatory at Albany, 150 miles distant.

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CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Communications and remittances should be addressed to

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